THE

PHOTOGRAPHIC NEWS:

A WEEKLY RECORD

OF THE

PROGRESS OF PHOTOGRAPHY.

EDITED BY

WILLIAM CROOKES, F.C.S.

VOLUME III

" *Nulla recordanti lux est ingrata.*"—MARTIAL.

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THE PHOTOGRAPHIC NEWS.

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HE promise contained in our last number, that we would ortly present our subscribers with a photoglyph, we intend lfilling next week.

The subject of the photoglyph in question is a view of a ortion of the Tuileries, taken by Messrs. Soulier and louzard, and is well calculated to put Mr. Fox Talbot's ewly-discovered process to a severe test. It may be adsable here, perhaps, to recapitulate briefly the substance of e description of his process, published by us some months ck, for the benefit of the numerous subscribers who have nce joined.

A plate, either steel, copper, or zinc, having been well eaned, is to be rubbed with a linen cloth dipped in a mixre of caustic soda and whiting, and afterwards rubbed dry ith ano . clean cloth; this process should be repeated vice. Coat the plate with a solution composed of 1 part of latine to 30 parts of water and about 8 parts of a saturated eous solution of bichromate of potash. Pour the solu- on the plate in the dark room as if it were collodion, ra off the superfluous liquid, and dry over a spirit mp; the plate is then ready for exposure. Lay the object be copied upon the plate, and expose in the copying frame the usual way—from one to several minutes in the sunine, and for a much longer period, if the sun is obscured; e operator must use his judgment in this matter. When e exposure has been sufficiently prolonged, the frame must e taken again into the dark room, and the plate withdrawn. n removal from the frame it will be seen that a faint nage is imprinted on the plate, the light having changed he yellow colour of the gelatine to a brown wherever it as acted. Sprinkle over its surface some very finely powered gum copal, and distribute it evenly, care being taken leave on the plate only a very thin layer. Lay the late, face upwards, over the flame of a lamp, until the opal is melted: this will require a considerable heat, and s accomplishment will be easily perceived by the change of olour. When this takes place, leave the plate to cool radually. This process may be termed laying the aquatint round.

The etching liquid is prepared as follows:—Take hydrohloric acid and add to it as much peroxide of iron as it vill dissolve by the aid of heat. When saturated, filter, nd afterwards evaporate it, until, as it cools, it solidifies nto a brown semi-crystalline mass. This substance is erchloride of iron. It is very greedy of moisture, and bsorbs it from the atmosphere, if exposed to it.

Water dissolves a very large quantity of perchloride of ron with the evolution of heat. Saturate a small quantity f water with the perchloride, and pour it into a bottle, which label No. 1.

Fill a second bottle with a mixture of five or six parts of his saturated solution, and label it No. 2; and a third bottle with a mixture of equal parts of this solution and water, and label it No. 3.

When the plate is quite cold, pour on it a small quantity of solution from bottle No. 2, and spread it quickly over the plate by means of a camel-hair brush, which has been used for no other purpose. The liquid will speedily begin to act on those parts of the plate on which the light has not acted—it being unable to penetrate through those parts of the gelatinous solution upon which the light has acted. The etching proceeds with considerable rapidity, and should be suffered to continue for some minutes. If the rapidity is too great, it may be checked by adding to No. 2 solution a little of No. 1, doing this with care, as the addition of too large a quantity would render its action too sluggish, and it would require to be stimulated by some of No. 3. When the exact strength required has been thus arrived at, the operator may proceed with confidence in his manipulations. The liquid must be moved about the plate during the whole operation with a camel-hair brush; and when the etching has proceeded far enough, the liquid must be wiped off the plate with a piece of cotton wool, and a stream of cold water poured over it so as to cleanse it as rapidly as possible; then wipe the plate with a clean linen cloth. When faint portions of the picture fail to appear, Mr. Talbot dips a camel-hair pencil in No. 3 solution, and touches these parts, which causes the details to appear with great rapidity; and it is evident that, in the event of its being desirable to check the action of the liquid on any part of the plate, this could be accomplished by dipping a pencil in No. 1, and applying it in a similar manner.

Such is the summary of the clear and lucid description of photoglyphic engraving communicated to us by Mr. Fox Talbot, and published in No. 7 of this journal.

The action of acids on metals has long been known, and nitric acid has been, and is, extensively employed by engravers in etching on metal plates, but this process must not be confounded with that of Mr. Fox Talbot. In the former case a plate is coated with a substance unassailable by the acid, and the engraver etches his design on this substance, taking care that the etching needle passes through it to the surface of the plate, which is thus laid bare to the action of the nitric acid. It is manifest that, by this method, the degree of perfection of the plate so etched must depend on the excellence of the designer in the first place, and secondly, on his skill in manipulating with the acid. By Mr. Fox Talbot's process, the plate is engraved without the intervention of any engraver. He himself, as he admits, has no practical knowledge of the art of engraving, and it may, therefore, be fairly considered that what he has done may, by means of the description with which he has favoured us, be equally well accomplished by any amateur who may possess the perseverance requisite to enable him to succeed. It is of course not open to all the world to practise this process, but judging from Mr. Talbot's liberal disposition in such matters, we feel quite sure that he would not object to any amateur trying as many experiments with it as he pleased, and that it would give him sincere pleasure to receive a good photoglyph from one who had been successful. This capability of producing an engraved plate by any unskilled person will, it may be reasonably anticipated, have a most important influence on the prospects of art, by bringing engraving within the reach of individuals, who, under present circumstances, are compelled to do without engravings altogether, or to accept such indifferent ones as can be obtained at a price within their reach. At present, the number of engravers who possess superior skill is very limited, hence the cost of engraving a plate of rather large dimensions is very considerable. Our readers may remember that a print publisher of Paris is said to have paid no less a sum than 3,000 guineas for an engraving of Paul Delaroche's celebrated painting of "The Execution of Lady Jane Grey." It is precisely this kind of engraving that Mr. Fox Talbot's process appears likely to supersede. Where the subject is one which is left

to the imagination of the designer, as in the case of illustrations of Shakespeare, or any similar work, it is very evident that the new art is unavailable; its great use being to bring within the reach of all classes copies of works which would otherwise be procurable only by the rich. Moreover, apart from the beauty of a plate engraved by this process in an artistic point of view, it possesses the inestimable advantage of rendering a faithful representation of the scene or object depicted. Much has been written by those who know, and very much more by those who do not know, anything of the subject, on the comparative values of photoglyphs and prints from plates engraved by hand; but we entertain no sort of doubt that ninety-nine persons out of every hundred would prefer the photoglyph before us to a print of the same subject from a plate engraved in the ordinary way, for the simple reason, if for no other, that they *know* that it gives a faithful representation of the object it professes to depict. It is to this minute fidelity with which photography renders objects, that the peculiar interest with which everybody looks at a photograph is owing. On looking at this photoglyph of the Tuileries with a lens of moderate magnifying power, we are enabled to perceive every detail of the sculpture which ornaments the entablature, and in the case of two of the apartments having windows at the back as well as in the front, the eye plunges into the interior of the room, and we are able to see that it is empty. If we regard the roof of the building, we see the scaffolding, erected there to carry out some repairs, delineated with extreme accuracy; every coil of the rope round the windlass is as visible as the details of the Corinthian columns which ornament the entrance to the palace. Everybody who has seen the Palace of the Tuileries will remember the very considerable elevation of the peculiarly-shaped towers—if we may use the word, in lieu of a more exact term; yet the tower in the photoglyph, with the iron railing which surrounds it, is perfectly distinct. The features, as well as the drapery of the figures immediately below the frieze, are rendered with the striking accuracy which characterises the photograph; and the same may be said with respect to the clock face and the sculpture surrounding it, though it is almost invisible to the naked eye.

The large size of this photoglyph, as compared with those presented to our subscribers on a previous occasion, enables one to estimate more exactly the artistic value of the process of photoglyphic engraving. In the proof we are now regarding, there is no want of half-tone—the great difficulty usually met with in chemical engraving; but though wonderful as the result of a purely chemical process—for it must be remembered, that not only is the plate from which this is printed entirely untouched, but Mr. Talbot will not avail himself in the slightest degree of the services of any person having a knowledge of the art of engraving—we are far from saying that it is altogether so perfect as its inventor is capable of making it, as we hope by his kindness to be, ere long, in a position to prove to our readers by the presentation of another specimen.

THE ACTION OF THE SOLAR SPECTRUM UPON CERTAIN COMPOUNDS OF SILVER.

BY SIR J. F. W. HERSCHEL, BART., F.R.S.

I hasten to send you (in consequence of your highly interesting editorial remarks on my letter of the 16th ult.) some spectra just obtai. ed. That numbered 1360 is on a paper prepared with ioduret of potassium, and exhibits in the most striking manner the phenomenon noticed in that letter, and which I had begun to despair of reproducing. In it, the extreme impression towards the less refrangible end descends to — 4·5 (allowing for the semi-diameter of the sun), and that towards the more refrangible extends to + 64·5 (with a similar allowance). The former limit a little surpasses the lowest result (— 4·0) before met with; the latter is much higher, surpassing it by 6·0, or by nearly a tenth part of the whole length of the spectrum, so as to give a total spectrum of 68·5 parts, which exceeds that before obtained by the use of the bromuret.

My manipulation was as follows:—The paper was first washed over with the iodic salt, and dried, and then washed with nitrate of silver, and all the excess of nitrate removed

1365. 1360. 1362.

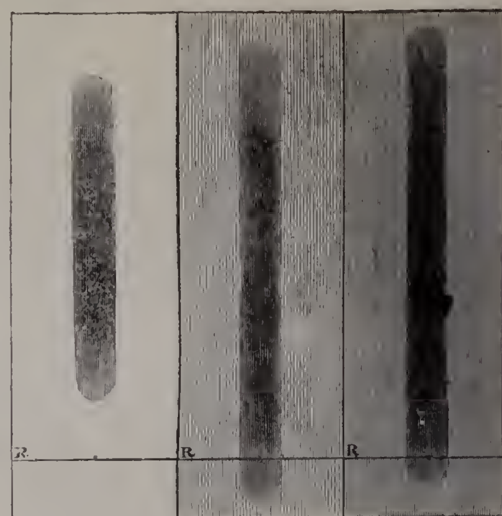


Fig. 1.

by soaking in water. Being then exposed to the spectrum, a wash of *lactate of silver* was passed over it, when the impression was produced with extreme rapidity and vigour, as the specimen (exposed 2½ minutes) will show.

The corresponding paper, 1365, is a spectrum obtained by

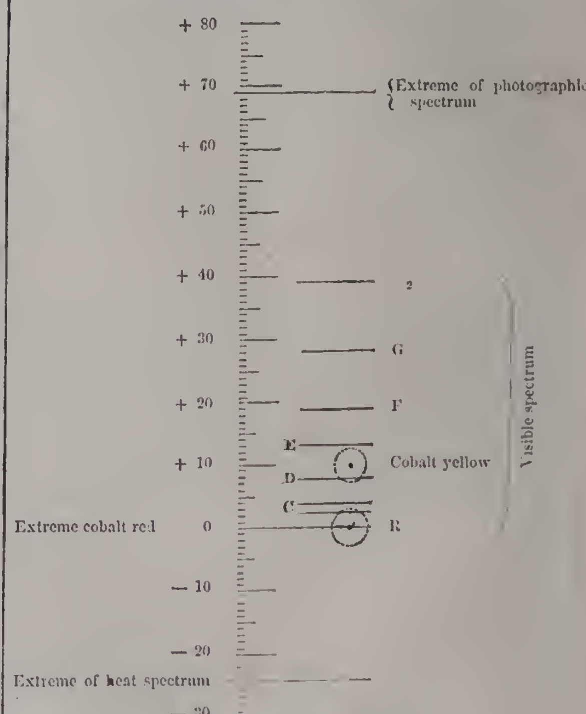


Fig. 2.

merely washing the paper (under the action of the light) with the lactate alone—exposure 2½ minutes. Its limits

(allowing for semi-diameter) are + 12·0, and + 62·0, with a perceptible second maximum at + 40, and a very sudden and rapid degradation from thence, or rather from + 42 to the end. You will not fail to remark the purity and whiteness of the ground of the lactic spectrum (*per se*) in comparison with all the others. It gives almost no indication of dispersed light.

I will not answer for the purity of my lactate. It was prepared by forming an extemporary oxide of silver, by precipitating the nitrate by lime water, and adding this to saturation to a quantity of rudely prepared lactic acid, made (some years ago) by evaporating sour whey.* A copious amount of insoluble silver salts separated as a white powder from the liquid, which, when filtered, was concentrated, so as to have a strong silvery reaction. My reason for trying this was to ascertain whether any other of the few soluble salts of silver could not be substituted with advantage for the nitrate. So far, the inquiry is a promising one. I should observe that the lactate requires to be *very* carefully kept from the light.

I also annex a spectrum, No. 1362, on bromuretted paper, similarly treated, which, you will perceive, is still limited, as before, barely to the attainment of the extreme red, though it extends some parts of the scale farther towards the violet end. But one of the most remarkable results is that obtained on a paper similarly treated with common salt, whose spectrum, under the influence of nitrate of silver, is comparatively feeble, but which, under this highly stimulating re-agency, has assumed a superb development, as the spectrum annexed (No. 1363) will show.

The arrangement of my apparatus for impressing the spectra is as in the annexed figure (fig. 3). A B are two *faultless* Fraunhofer prisms of flint glass (the personal gift of that eminent artist); they are held together by a frame C, and attached by an axle passing through a standard D (so as to allow of adjustment to their situation of minimum

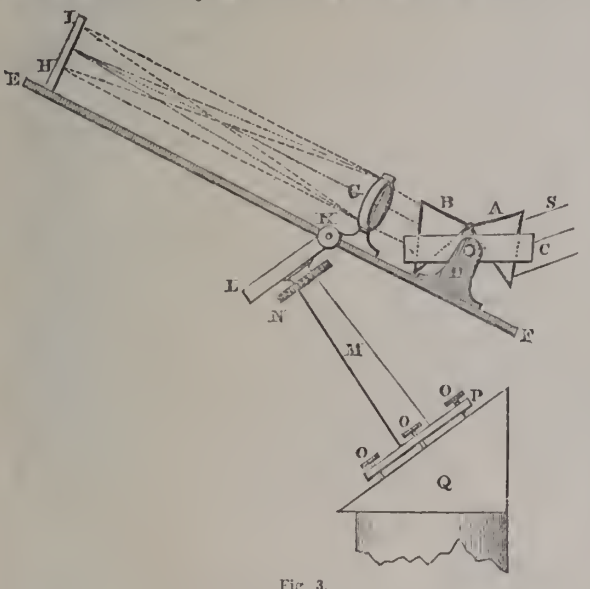


Fig. 3.

deviation) to a long board E F, which also sustains an achromatic object glass G of about 25 inches focus, which collects the dispersed rays of the solar beam S on a screen I H adjustable by a sliding movement on E F to the exact focus. On this the *visible* spectrum occupies a space of about 40 parts of the scale annexed (30ths of an inch). This board, with its prisms, lens, and screen (which is carefully enveloped, during each experiment, in a black velvet coating to keep out extraneous light—by constructing on it a sort of tilt wagon cover, not shown in the drawing), is supported on an axis K attached to a board L, fixed on the wheel on the top of a brass axis M directed to the pole of the heavens, and is carried round to follow the sun by a clock, which pulls round an arm attachable to the wheel N (this arm is not shown in the figure). The whole rests on and is adjustable to the proper position by screws O O O passing through a stand P on a block Q at the top of a post firmly fixed in the ground.

1365, 1360, 1362, are figures of spectra so obtained. 1365, on lactate of silver *per se*; 1360, on paper previously impregnated with ioduret, and 1362 with bromuret, of potassium.

P.S.—Have any of your correspondents noticed the intense cold produced by the solution of crystallised nitrate of silver? It has more than once happened to me, on dissolving a pretty large quantity, to *freeze the water*, or, at least, a considerable portion of it.

Collingwood, August 20, 1859.

* It had not grown in the least mouldy.

PHOTOGRAPHIC FAILURES—THEIR CAUSES AND REMEDY.

BY ALEXANDER WATT.

In selecting this theme, I fear I have chosen one which is almost endless. Still I think it important, inasmuch as it may, if treated with care, assist those who daily meet with failures from causes which they may be unacquainted with, and would gladly remedy, if shown the way.

In the series of articles which I purpose devoting to this subject it will be quite impossible to adopt any strict form of classification; but, by treating the various failures under separate heads, an arrangement may be made by which the reader will have his attention drawn at once to the subject most interesting to him when involved in difficulty.

It may be advisable, moreover, in case reference is necessary at any time, to append a number to each paragraph, and thus the reader will be spared some of the confusion which might otherwise arise.

Amongst the causes of failure I of course include imperfections of all kinds; and these I will endeavour to point out as carefully as possible, showing the remedy in each case as concisely as I can to be properly understood.

1. *Spots on glass negatives and positives.*—There are so many causes of spots that I fear it will be almost impossible to mention them all. However, the following are of most frequent occurrence:—After the final washing, the picture, when held up to the light, appears covered all over with myriads of minute transparent spots. These generally arise from two causes: either the bath is full of small particles (which is likely to be the case when a gutta percha vessel is employed), and in which case the liquid must be filtered: or, the inside of the camera is dusty (a very common cause of small spots). The camera should then be carefully wiped inside with a *damp*—not wet—cloth. If the gutta percha bath has been allowed to stand aside for any length of time, without having been well rinsed, the crystals of nitrate of silver which are formed upon its interior surfaces after awhile act upon the gutta percha, producing a rottenness of the surface which, when used again, will be readily removed by the friction of the dipper, and thus particles will get into the bath which are of a very dangerous character. I have known three gutta percha baths in one establishment, from the cause named, produce long spots or comets—sometimes of the shape of a bayonet—to such an extent that it was utterly impossible to obtain a good picture: even a few minutes after the exciting solution had been filtered and the bath thoroughly washed out, the same defects showed themselves—the *only* remedy being to abandon the gutta percha vessel. In my opinion, this material should *never* be employed to contain the exciting solution. The spots, or comets, that occur under these circumstances, are generally transparent, and a solid nucleus may be seen, on examination, which was the cause of the mischief. Spots of a different character frequently occur in consequence of the collodion containing

small crystals of undissolved iodide. By adding a drop or two of water to the collodion, or a little diluted alcohol, these crystals may be redissolved. The collodion should then be allowed to settle for at least twenty-four hours before using.

Opaque spots are sometimes found upon the image after development, and when the plate is brought out to the light it shows, by transmitted light, numerous black spots of considerable density. These are usually caused by *slamming* the shutter of the plate-holder, whereby small particles or crystals of nitrate of silver, which accumulate on the frame of the plate-holder, are projected upon the plate, and, as a matter of course, the developing agent has an increased action upon each of these particles of nitrate—hence the black opaque spots. Wipe the plate-holder well with a *damp* cloth, and do not close the shutter too abruptly.

I believe one of the chief causes of "spots" is attributable to employing a gutta percha bath, and this more especially, as I have before observed, when the bath has been allowed to stand aside for some time without having been well washed. When this is the case, it will be advisable, before using the bath, to clean it well with nitric acid, to which a little water has been added. The bath must then be well rinsed with clean water, or soaked for an hour; lastly, rinsing with distilled water.

2. *Lines* are frequently observed to traverse the whole of the plate, *from top to bottom*, passing sometimes over the face of the image. This occurs most commonly, I think, with a thin collodion, though I have known a glutinous collodion give a similar result. I believe this defect shows itself more frequently with a bath which has accumulated iodide, from excessive use, than with one newly made. I have generally succeeded in avoiding the formation of these lines by moving the plate *laterally in the bath*, without drawing it out, after it had been immersed about fifteen seconds, and then lifting it out of the bath several times to remove the ether, as usual.

Occasionally opaque lines will be found to issue from the plate in various directions, and, on examining the glass, after the film has been partially washed off, there will be observed numerous scratches in the glass itself which were the cause of the mischief: where those lines were, a larger proportion of iodide was retained—hence the opacity of the lines.

Transparent lines are, I believe, almost universally due to the glasses not being properly cleaned. Sometimes, when breathing upon a glass to see if it be clean, a single globule of moisture will be ejected from the mouth, and if the plate be immediately "dusted," either with a silk handkerchief or soft brush, this atom of moisture, which contains organic matter, becomes smeared into a long line or streak, and the after chemical action is *weakest* at this point—hence its *transparency*.

Horizontal lines, caused by jerking the plate when first dipping it into the bath, and the curved lines, caused by unequal development, I need not dwell upon, as, doubtless, these defects only occur with those who are receiving their "first lesson." My chief aim is, to point out those defects which, though common, are not strictly speaking of an ordinary character.

3. *Weakness of the image.*—Sometimes we find, after immersing a plate in the bath for the usual time, that, when it is developed, it looks poor and weak—the negative not being more dense than a positive, and the latter being too pale to bear backing up with velvet or black varnish, either of which would show through the *lights*. This poorness arises from several causes. It most frequently occurs, however, when the collodion has become very red, when it loses the action of a certain proportion of the salt with which it was iodised by decomposition, a certain amount of iodine being set free. A piece of silver being thrown into the collodion will cause it to regain the pale straw colour; but although the collodion is thus partially decolorised, its activity, as far as my own experience goes, does not appear to be augmented, nor do I see any *theoretical* reason why it should.

Sometimes, also, the image will be weak when the collodion is recently iodised. When this is the case, I have generally succeeded in obtaining dense negatives by adding to the bath a few drops of acetate of ammonia, as recommended by Hardwich in his admirable work.

I believe that weak negatives are commonly the result of employing a newly-iodised collodion in a bath which, from long use, has become highly charged with iodide of silver. In this case, I should recommend strengthening the bath to 35 or 40 grains. If this be done, the operator must watch with extra care the progress of development, or the picture may become too dense to print well. Sometimes in warm weather, under these circumstances, I have found it necessary to dilute the one-grain pyrogallic acid developer with an equal bulk of water, when I obtained capital results.

If, when the bath has been much used, it is found to give weak results, it is advantageous to dilute the bath with an equal bulk of water, filter until quite clear, and then add fifteen grains of nitrate of silver to each ounce of the weakened bath.

In cold weather it may be necessary, perhaps, to use more pyrogallic acid in the developer, though I have not yet derived much advantage from doing so. I would prefer employing a stronger bath with a few drops of acetate of ammonia. By the way, this salt must not be added in excess—two or three drops will generally suffice—or crystals, very beautiful, but troublesome, will be formed in the bath, which even filtration will not always remove effectually.

4. *Overdensity* of the high lights, with an absence of half tones, will sometimes occur, even when using a newly-prepared collodion; and this defect will show itself occasionally with any amount of exposure in the camera. I have overcome the difficulty by immersing in the bath a collodionised plate, where I have left it to remain all night. The bath being a newly-made one was improved by this, and the following day I was enabled to take good negatives possessing plenty of half tone, with the requisite density.

It is advisable, also, when the negatives appear too dense in the high lights, although the plate has been sufficiently exposed, to weaken the developing agent.

5. *Ununiform iodising of the film.*—This occurs from several causes. In hot weather the operator is apt to return the collodion to the bottle *too quickly* after he has covered the plate, in which case the opposite end to that from which the collodion enters the bottle retains *too little* of this substance, and when it has been sensitised it will be discovered that there is a *poorness* at one end or corner of the plate; therefore, in pouring off the collodion, it should be done leisurely and not too suddenly.

Many persons think that in hot weather the collodion requires to be hastened off the plate, whereas my own experience and observation lead me to an opposite view, for at a high temperature the evaporation of the ether is greater than in cold, and the *evaporation* of this substance will *keep the plate cool.* Nay, it is probable that the temperature of the plate, when the collodion has been on it but a few seconds, is very little above that of the *freezing* point! To satisfy himself of this, let the reader drop some ether upon the back of his hand, continually at the same spot, for half a minute, and I warrant he will find the weather cold enough there!

Again, the film will not be uniformly iodised if the collodionised plate be kept too long before immersing it in the bath; but this, I fancy, every one knows. And unless the plate be well drained before being placed in the camera, the lower part of the plate will be imperfectly acted upon, owing to the liquid nitrate of silver floating on the plate at the lower part. There is no necessity to hurry the plate into the camera where time is no object, for if it remains in the plate-holder for several minutes in the hottest weather, I do not believe any injurious effect would result. I have frequently kept the plate for a minute or two, and have exposed it in the camera for five minutes further, when using a small stop to copy a dark oil painting, even in the

month of July, and I did not find the film in any way impaired by the tardiness of the operation. After ten minutes I should begin to fear that the nitrate of silver would take it into its crystalline head to eat the iodide of silver which it had formed, as rabbits eat their young!

(*To be continued.*)

DESCRIPTION OF A PLAIN OR WAXED PAPER PROCESS IN PHOTOGRAPHY.*

BY JESSE MITCHELL, ADJUTANT 1ST NATIVE VETERAN BATTALION.

The best mode of suspending iodised papers is to hang up each sheet with two of the American spring clips, made of beech, and sold in London at one shilling a dozen. They are to be strung upon a piece of bobbin or thin cord, and stretched across a room that is free from dust, which would soil the papers, and from strong draughts of air, which would tear the paper out of the clip.

An additional precaution which I found necessary to prevent staining is, to prepare some strips of new blotting paper, as wide as the clips and about three-quarters of an inch long; fold these in two; and having taken up a paper by two corners, let an assistant drop one of these papers on each corner close to your fingers; let him then open a clip, and you should put in one corner of the paper where the blotting paper is; you will find it most convenient to open the second clip yourself. A small strip of blotting paper should be placed at each of the lower corners to facilitate draining, and prevent an excess of the iodising materials from lodging there, which will be the case if this is not attended to.

When the papers are dry, trim off the half inch in excess of the length of the slide from whichever end appears most to need it, and put them by in an envelope made of coarse drawing paper, which should be kept in a portfolio, or a tin case made for the purpose.

Thus far the operations may be conducted in any convenient room; but those which I am about to describe must be carried on in a room fitted up for the purpose, and into which no ray of white (or common daylight) must be allowed to enter whilst either the exciting or developing papers is in progress. This we will call the operating room.

Where circumstances permit, the best light is obtained through a ruby coloured glass made for this purpose; one or two moderate size panes of this should be fitted into a window or door, if possible at the level of the table, that being the most convenient direction of the light in many photographic operations. The light thus procured will not affect collodion (unless the sun shines upon the glass), and is so abundant as to permit everything to be seen with the greatest comfort. Where this mode of fitting up a room cannot be adopted, a double fold of long cloth, or close woven country cloth, dipped in an aqueous solution of turmeric, and made to fit close to the wall, makes a curtain that obstructs the actinic rays, and admits a considerable amount of light, but not so much as the glass.

TO EXCITE FOR THE CAMERA.

The exciting solution consists of—

Distilled water	1 ounce.
Crystallised nitrate of silver	25 grains.
†Glacial acetic acid (half a fluid drachm)	30 minims.

This solution should either be kept in a yellow glass bottle, or in a bottle with a wooden or dark pasteboard cover; as, although aceto-nitrate of silver is not liable to be decomposed by daylight when the chemicals are pure, it becomes so after contact with the organic matters contained in the iodised paper.

Filter as much of this solution as will cover the dish to the depth of a quarter of an inch. Float the marked side of the paper on it for four minutes, taking care that there are no air bubbles. These, if any exist, will be indicated (in from thirty to sixty seconds) by that part of the paper remaining of a dark colour, whilst the remainder is becoming white, apparently, but, in reality, of a primrose yellow colour. Have ready a dish with distilled water, and float the excited paper on it for a minute or two; this removes the excess of nitrate (perhaps some nitrate of potash, &c.), and makes the paper keep longer without becoming discoloured. On a clean table, or a board kept for the purpose, put three or four folds of blotting paper, with a fresh piece on the top; on this lay the wet side of your paper, and cover it with another piece of fresh blotting paper; blot off the excess of fluid by passing the hand lightly and equally over it. Then put it in between fresh blotting paper and place it in a drawing paper envelope, which may be deposited in a portfolio or a flat tin case made for the purpose, until required to be put in the slide. This should not be done for about half an hour, unless it be intended to expose it immediately, as the evaporation from the paper is condensed upon the glass, and forms a number of small plano-convex lenses, which doubtless refract the rays that have passed through the glass of the slide and injure the picture.

I have not had occasion to keep this paper longer than 18 hours after exciting; it kept well for that time.

EXPOSURE IN THE CAMERA.

With a given paper and light, the time of exposure will depend upon the focal length of the lens, and the aperture of the diaphragm in front of it. My pictures were taken with a 4 inch landscape lens of 20 inches focus, with an aperture of half an inch in the diaphragm. And the time of exposure I found necessary will be the best guide I can give to others.

I took a good negative of the Catholic Cathedral in 9 minutes, between 3 and 4 P.M., the paper having been excited about half an hour previous to exposure in the camera. This is a white building much darkened by time. There were some deep shadows, the detail in which is fairly rendered: the Casuarina trees also would have been tolerably well represented, had it not blown very hard at the time. During half the time of exposure, the sun was obscured by a small, but dense, black cloud. The Museum was taken between 7 and 8 A.M., on paper excited on the previous evening; it was exposed 9 minutes in bright sunshine. This was perhaps exposed rather too long to be called a good negative, although not altogether to be despised. It need not have been made quite so intense, but there was a palankeen carriage and horse in a very deep shadow under a large tree, which I wished to bring out, or else the development could have been stayed earlier. These pictures were developed in 23 and 24 minutes, $\frac{1}{12}$ of the volume of gallic acid being added from the exciting solution.

(*To be continued.*)

* Continued from vol. ii. p. 302.

† Note.—If the unwaxed paper is to be kept some hours before exposing and developing, it will tend to the preservation of the whites if the quantity of acetic acid be increased to 35 minims; this will make the paper somewhat slower.

THE MEANS OF RECOVERING SILVER FROM ITS WASTE SOLUTIONS.

BY J. SPILLER, F.C.S.

The consideration that upwards of 90 per cent. of the silver employed in the production of photographic prints upon paper is of but temporary service in the course of the process, and not retained in the finished result, should point to the necessity for economising as much as possible the several solutions in which any considerable quantity of this metal is known to have accumulated. For the recovery of the silver from the nitrate solution the processes of reduction by metallic copper, or that of precipitation as chloride and subsequent fusion with carbonate of soda, would probably be considered the most eligible. The waste hyposulphite solutions have, however, usually required a more difficult treatment for their reduction, on account of

the peculiar condition in which the silver is contained in them, not being precipitable by a soluble chloride. These it is, especially, that I have lately been experimenting upon with the object of comparing the several means at command for the extraction of the metal.

The hyposulphite fixing bath, after repeated employment, will, if set aside, gradually let fall the greater part of its silver in the state of an insoluble black sulphide, which usually forms an adherent crust on the bottom and sides of the vessel. The portion of metal remaining dissolved may also be completely precipitated by the addition of sulphide of sodium or ammonium, and thus the entire quantity of the silver collected on the filter as sulphide. This, dried, should be triturated with about an equal weight of carbonate of soda, and added, by successive portions, to fused nitre, employed in tolerable excess. The process is known to be finished when the contents of the crucible no longer show any trace of the black particles of sulphide; and, according to the temperature of the furnace, the silver will either be found as a melted button, or in the condition of a honeycombed, partially-fused, mass, in which latter case it is convenient to pour off the flux while yet fluid, so that the product may afterwards be more readily washed from the alkaline salts in a stream of water.

The silver recovered by this process is not likely to contain any other impurity than a small quantity of gold, originally derived from the toning bath; and this will be left behind, as a purple or brown powder, on dissolving the metal in nitric acid. Furthermore, the flux has been repeatedly tested for silver, but none found, unless the precaution of adding carbonate of soda has been omitted.

War Department, Woolwich, Sept., 1859.

THE ACTION OF LIGHT RENDERED VISIBLE.

To complete his studies on stored-up light, to adopt his own expression, M. Nièpce de St. Victor has for some months past been carrying on a series of very curious experiments, which will, ere long, form the subject of a communication to the Academy of Sciences. Without desiring to anticipate him, we shall at present offer a few observations on a remarkable fact which M. Nièpce has verified.

The experiments we speak of bear on the influence which the luminous rays exercise on different bodies examined by M. Nièpce, not in a solid state, but in the form of a solution. Thus, instead of spreading nitrate of uranium on a sheet of paper, he dissolves it and mixes it with organic matter—gum, or other substance—likewise in solution. If, after insolating this liquid, a certain quantity be poured into a glass tube, and nitrate of silver added, it acquires a tint which varies from a clear red brown to the most intense inky blackness, according to the degree of insolation it has undergone. There is a maximum of insolation, after which the liquor gradually loses its action on nitrate of silver.

If the solution is composed of oxalic acid and nitrate of uranium, carbonic acid gas is liberated with effervescence under the action of even diffused light. To assure himself that heat had no share in the production of this phenomenon, M. Nièpce placed the flask containing the solution in a vessel containing water, which he heated to boiling, but no gas was given off.

In this fact there lies the principle of an apparatus for measuring, comparatively, the action of light.

A graduated tube passing through the cork of the flask would receive the liquid, which, under the pressure of the liberated gas, would ascend more or less according to the power of the luminous rays, during a given space of time.

We give this idea, put forth by M. Nièpce, for the consideration of instrument makers, who, we think, may make something of it.

At the same time that our learned fellow-countryman was making this interesting discovery, Dr. Draper, of New York, had been engaged in an analogous work.—*La Lumière*.

Critical Notices.

Stereograms of Fountain's Abbey, Kirkstall Abbey, &c. By Mr. W. Woodward, Nottingham.

Those who have seen only the ordinary stereoscopic prints exhibited in the shop windows can have no idea of the beautiful pictures that may be obtained for the stereoscope by a superior operator. We have just concluded an examination of a series of views of Fountain's Abbey, Kirkstall Abbey, and York Cathedral, taken by Mr. Woodward, of Nottingham, and we do not hesitate to say that whoever has not seen these prints is ignorant of the high perfection which may be attained in the reproduction of scenes for the stereoscope. It is not merely that they are free from imperfections which we too frequently meet with in photographs, but they show, on the face of them, that they have been taken by an artist, one who is capable of distinguishing the most beautiful point of view from which to seize them, so as to produce pictures of the highest artistic merit. It is commonly said that Englishmen know more of the beauties of foreign countries than of their own, and it is probable that many who are familiar with the ruins of Rome are ignorant of the magnificent appearance presented by the ruins of Fountain's Abbey. The series of views we have been inspecting are nine in number, no two of which can be said to resemble each other, so that some idea may be formed of the extent of these ruins from this circumstance.

About the best picture of the series, if we may describe one as better than another, is that which gives a general view of the ruins from De Grey's walk on the south. From this point of view they present almost the appearance of a town, with the massive and lofty square tower rising in the distance, looking as if it were built but yesterday. The view from the west, however, shows that one corner of this tower has begun to decay, but the same print which informs us of this also conveys the visual information that care is being taken to preserve the ruins as much as possible from further deterioration. A tall scaffolding is raised to the summit of the west end of what was apparently the church, every detail of which is conveyed to the eye through the picture as vividly as if one were on the spot. Every plank and every pole, even the ropes which bind these together, can be distinctly seen, together with the delicate blades of the grass on the summit of the lofty wall. The perfect manner in which every gradation of tone is rendered in this print is unsurpassable.

The view of the ruins, on the south-east from De Grey's walk, includes the old chancel; the fine windows still retain their pointed arches, though the stone above and around them has crumbled away. There is a slight difference between the two pictures in this view, as, indeed, occurs in one or two other instances, arising from the operator preferring to use a single lens camera (for which he has doubtless sufficient reason), and thus the movement of the sun shows a decided difference in the shadows, sufficient in some cases to cause an almost painful effect in one or two of the pictures. In the view of the choir and nave we have another specimen of the wonderful fidelity with which every detail is rendered; the smallest inequality in the surface caused by the breaking away of fragments is as distinctly perceptible as to the eye of an observer on the spot, every variation of light and shade being depicted with the minutest accuracy, the faint tracery of the branches of the trees upon the sky being seen through the old mullions, from which the glass has long since been removed, and adding to the charm of the picture. In the print representing the south aisle we have a long perspective of arches, perfect and entire, but the masonry which rested upon them and supported the roof has, like the roof itself, almost wholly crumbled away. The most delicate tones are given in this print, with the same clearness which characterises all the others: every blade of the grass which crowns the ruined masonry being reproduced with the same sharpness and vigour as the ruins themselves.

Our space will not permit us to dwell upon each of the pictures in succession, but we cannot refrain from observing that the view of the gateway of the Eleemosynary Chapel, as likewise that of the bridge leading to the Eleemosynary, are two of the most beautiful prints, in appearance and execution, ever submitted to our judgment.

Of York Cathedral the artist has taken only two views—one from the south, the other of the west door merely, which, if they are less picturesque than those we have been describing, are not inferior in artistic excellence.

The beauty of the stereograms of Kirkstall Abbey makes us regret that Mr. Woodward only took two pictures—one of the west door, the other of the nave looking east. The latter exhibits the splendid pillars, which are slightly different from the huge Norman style, but exceedingly massive, and apparently as solid as on the day they were finished, as are the stone mullions of the windows in the highest portion of the ruins. The more closely we look into this picture the greater is the regret we feel that the artist did not avail himself more fully of the opportunity offered by the great extent of these ruins, their length, if we remember rightly, being 350 feet in one direction and 450 in the other. This Abbey is said to have been built by the Earl of Lincoln, in consequence of a vow he made when suffering under a severe fit of illness, this spot being suggested by the Abbot of Fountain's Abbey.

We need scarcely tell photographers that much of the beauty which their negatives are capable of yielding depends on the manner in which the printing is conducted, the same negative giving a beautiful print in the hands of one man, which in the hands of another appears capable of yielding a print hardly above mediocrity. The appearance of Mr. Woodward's prints is a proof that he is one of those who possess an exceptional skill in printing; no stains or markings of any description are visible, and they are printed to the exact intensity calculated to give the most pleasing result. For this reason, it gives us much satisfaction to inform those of our readers who may desire to save themselves the trouble of printing from their own negatives, that Mr. Woodward proposes to open a printing establishment shortly, chiefly for the purpose of printing all his own pictures, but in which, we doubt not, he will be willing to print from any number of negatives sent to him.

Dictionary of Photography.

Fogging.—Of all the evils that can happen to a photographer, that known under the name of "fogging" is the one most liable to perplex and puzzle a beginner, and, in fact, so little do we really know concerning the true causes of this troublesome appearance, that the most experienced operator is not unfrequently brought to a stand-still from this effect suddenly taking place with chemicals that but a few minutes before worked in the most satisfactory manner. A little reflection will show that the effect known by this name is one to which so delicate a process as the one now universally adopted is preeminently liable. A sensitive material is produced, the molecular arrangement of the atoms of which is in a state of *tottering* equilibrium, ready at the slightest cause to rearrange its particles in such a way that on being brought in contact with *nascent* silver (*i. e.*, silver in the act of being precipitated in the metallic state) it shall attract and hold to it the infinitesimal atoms, and gradually build up an opaque, metallic film. Now, when we consider how inappreciable must be the action of the luminous ray capable of inducing such an action; so delicate, in fact, that English and continental men of science have hitherto endeavoured in vain to prove ocularly that the active ray of light has produced *any* change, we can no longer wonder at this balance of forces being overturned by some other agent than the light, but are surprised at such an effect not oftener taking place and making itself known by a uniform precipitation of particles of silver all over the plate. The following is a tolerably complete list of the causes of fogging, with the remedies for the same:—

Diffused light may have fallen upon the plate during the time which elapses between the first immersion in the sensitising bath and its development. The source of illumination of the dark room must be carefully examined; perhaps the candle or gas is too near, or not sufficiently protected; or the yellow calico has faded; guard also against daylight finding entrance in any part. Test also the camera for diffused light, according to the method recommended in our first volume. See if the sun shines on any part of the lens. If a landscape lens be used of one of the new Petzval construction, the pictures produced by it are likely to be affected with fogginess, owing to the numerous reflecting surfaces of glass tending to obscure the image and produce diffused light in the camera.

Over-exposure is also a very common source of fogging, and one to which beginners seem to be especially liable: next in frequency to this comes

Alkalinity of bath.—The bath should be kept slightly acid with acetic acid, and the tendency which it has to become alkaline tested with litmus paper and corrected from time to time.

Impure nitrate of silver is also a very fertile cause of fogging; none should be used but what has been fused and recrystallised.

Impure water used for dissolving the nitrate of silver will give the bath fogging propensities. Thus, rain water having a perceptible smell, or distilled water which is not prepared on purpose, but is derived from the condensed steam from some machinery, and consequently impregnated with oily matters, are frequently used and considered by amateurs to be as good as properly-prepared distilled water. It is needless for us to say, that with such a solvent a foggy bath is almost sure to be the result.

Gutta percha is now a frequent cause of this fault, owing, however, more to the shameless way in which it is adulterated than to any injurious effect of the pure article.

Colourless collodion always has a *tendency* to fog, although, if the bath and other chemicals are in excellent order, it may be used with impunity.

Hot weather.—During the high temperature experienced in London some weeks ago it was almost impossible to obtain clean negatives without largely increasing the quantity of acid in the developing solution.

An iron developing solution always has a greater tendency to give foggy pictures than one prepared with pyrogallic acid.

Among sundry other causes of fogging the following are given on the authority of Mr. Hardwich:—

a. Vapour of ammonia, or the products of the combustion of coal gas escaping into the developing room.—*b.* Development of the image by *immersion* in solution of sulphate of iron: it is better to pour the fluid over the plate and not to use the same portion twice.—*c.* Re-dipping the plate in the bath before development: this is apt to give a foggy picture when using an old bath.—*d.* Omission of the acetic acid in the solution of pyrogallic: this will produce a universal blackness.—*e.* Fogging of glass positives from the bath not having been kept in a dark place.—*f.* Developing solution or hyposulphite inadvertently dropped into the nitrate bath.—*g.* Metallic iron left in contact with the bath solution.—*h.* Long-continued use of oil of cloves, or iodide of iron in collodion.—*i.* Honey employed as a preservative agent in very hot weather.—*k.* Using too strong a developer in hot weather, or keeping any developer, and especially sulphate of iron, on the film for too long a time.

(*To be continued.*)

The Amateur Mechanic.

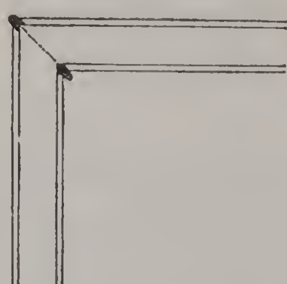
GUTTA PERCHA—(*continued*).

In the method we gave last week as to forming a joint in the gutta percha water-pipes for the operating room and laboratory, there is a little danger of closing the passage through the tubing if the operation be not skillfully performed. To obviate any chance of this, adopt the following method:—Having softened and expanded the ends of your tube, take a small piece of the same tubing, about the length of the diameter of the pipes to be joined. Carefully dry the softened ends, and, inserting the small piece in each widened orifice, bring them firmly together. They may then be sealed with a warm iron.

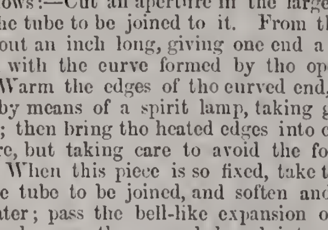
A sectional view of the joint so formed would be something like the following.

The advantage of this process is, that it prevents any danger of the tube contracting or closing at the joint.

Bends in gutta percha tubing should not be made sharp or angular, but as gently curved as possible. Where direct angles are required, they must be made by the formation of elbow joints in accordance with the following directions:—Cut the ends of the two pieces of tubing to be joined with such a slope as to form a mitre at the required angle. Heat the edges sufficiently to soften them, and then dry them carefully: the flame of the spirit lamp judiciously used will aid in making sure of this. Then bring the softened edges together with firm but gentle pressure, remembering that it is important not to raise a burr or ridge in the inner side. Having brought the edges together without undue pressure, pinch the outer edges of the junction together all round with the finger and thumb; this done, it will be well to hasten the cooling by pouring cold water on to the joint, or plunging it altogether into a vessel of cold water. The joint may then be strengthened by surrounding it with a thin strip of softened gutta percha. The annexed engraving shows the form of the joint.



To join a small tube to a large one at right angles with it, proceed as follows:—Cut an aperture in the large tube, of the diameter of the tube to be joined to it. From the small tube cut a piece about an inch long, giving one end a curved form, to correspond with the curve formed by the opening in the large tube. Warm the edges of the curved end, and those of the aperture, by means of a spirit lamp, taking great care not to burn them; then bring the heated edges into contact, using gentle pressure, but taking care to avoid the formation of a ridge inside. When this piece is so fixed, take the remaining portion of the tube to be joined, and soften and expand the end in hot water; pass the bell-like expansion over the piece already attached, press the expanded end into a flange, and having gently heated the surface of the larger tube around the joint, press the flanged end of the small pipe into firm contact. The joint may then be neatly sealed and finished with a piece of heated iron. A section of the joint so formed is given below:—



This joint may be strengthened, if it be thought necessary, by affixing a strip of softened gutta percha round it.

It is important in fitting up gutta percha tubing to give it a little play, so as to allow for the contraction which generally takes place. Instead, therefore, of fixing it quite straight and rigid, it should be placed in slight serpentine waves, thus:—

The tubing thus placed will, probably, in course of time, become quite straight and tight. To give it the fullest play in contracting, the hooks used in fixing it to the wall should not be driven "home" or tight up, so as to bite the tubing firmly; the grasp of the hook should be sufficiently loose to prevent any strain on the tube in the process of shrinking.

Gutta percha tubing may be used without hesitation for the conveyance of most of the fluids in use in the laboratory. It should be employed unquestionably in preference to lead for the conveyance of water, as the salts of lead present, in greater or less proportions, wherever pipes of that metal are used, render the water generally unfit for chemical purposes. We need scarcely say that varnishes, collodion, &c., or anything possessing a solvent action should not come in contact with gutta percha. For this reason, it is unfit for the conveyance of hydrogen gas, which will gradually find its way through it. We would caution our amateur readers against using it for that purpose, should they contemplate the use of gas in the operating room or laboratory.

(To be continued.)

Photographic Chemistry.

In concluding the series of articles on photographic chemistry we promised that we would resume the subject on a future occasion, and treat it in a more comprehensive form. It will be evident to our readers that a knowledge of chemical agents besides those at present used in photography is essential to them if they wish to extend their researches beyond the present photographic limits; and, moreover, chemistry is itself one of the most interesting of sciences, and the study of it affords delightful recreation. To make these articles complete, we commence with

CHEMICAL NOMENCLATURE.

The number of diverse bodies which we find in nature, or which we are enabled to produce in our laboratories, is so considerable that the most wonderful memory would be requisite to retain their names if each were furnished with a distinct name chosen at random. Long since, therefore, chemists saw the necessity of adopting a systematic nomenclature which would admit of the names of compound bodies being formed by a combination of the names of the elementary bodies of which they were constituted; a simple method which up to a certain point admits of the nature of a compound being understood by its name alone as well as some of its more essential properties. At the time this system was established it answered very well, but subsequent discoveries have so enlarged the domain of chemistry that it is sadly deficient now; but if a change were attempted it could only be accomplished by slow degrees, and with very great difficulty. Moreover, the time has hardly arrived for such a step, many modern chemical theories being still under discussion, and any change short of establishing a universal chemical nomenclature would be of comparatively little use. Before, however, we offer any further remarks on this part of the subject, we will give the names of the simple bodies, with the symbols by which they are known, and which it is essential should be committed to memory before proceeding further:—

Oxygen	O	Barium	Ba
Hydrogen	H	Strontium	Sr
Nitrogen	N	Calcium	Ca
Sulphur	S	Magnesium	Mg
Selenium	Se	Beryllium	Be
Tellurium	Te	Aluminium	Al
Chlorine	Cl	Zirconium	Zr
Bromine	Br	Thorium	Tr
Iodine	I	Yttrium	Yt
Fluorine	Fl	Cerium	Ce
Phosphorus	P	Lanthanum	La
Arsenic	As	Didymium	Di
Carbon	C	Erbium	Er
Boron	B	Terbium	Tr
Silicium	Si	Manganese	Mn
Potassium	K	Chromium	Cr
Sodium	Na	Tungsten	Tg
Lithium	Li	Molybdenium	Mo

Vanadium	Vd	Pelopium	Pp
Iron	Fe	Antimony	Sb
Cobalt	Co	Uranium	Ur
Nickel	Ni	Silver	Ag
Zinc	Zn	Gold	Au
Cadmium	Cd	Platinum	Pt
Copper	Cu	Palladium	Pd
Lead	Pb	Rhodium	Rh
Bismuth	Bi	Iridium	Ir
Mercury	Hg	Ruthenium	Ru
Tin	St	Osmium	Os
Titanium	Ti	Ilmenium	Il
Tantalum	Ta	Norium	No
Niobium	Nb		

Many of these bodies are very rare, and seldom employed in chemical manipulations. The names of one or two among them have been derived from the Greek, as oxygen and nitrogen, for example; the former of which is formed of a combination of two words, one signifying *acid*, the other *I engender*, and the latter from two words signifying *I engender nothing*. This attempt to give simple bodies a name implying certain qualities is nothing less than a mistake, because the inference which might be drawn from the examples quoted is that oxygen alone produces acid, and nitrogen alone is capable of destroying life, whereas there are in reality other bodies which possess the same properties. Consequently it appears to us better that the discoverer of a new substance should give it a name with which its qualities have no connection.

Chemists have generally agreed to divide the simple bodies into comprehensive classes—the *metals* and the *metalloids*, the characters of which we shall presently describe. The class of metalloids are comprised in the first fifteen names on the above list, the remainder being included in the class of metals.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 4th September, 1859.

DR. PHIPSON has lately observed a curious phenomenon,—namely, the production of an organic colour by the influence of light upon starch.

A certain quantity of ordinary starch is placed in a transparent glass bottle, so as to half fill it; upon the starch is poured a weak solution of nitrate of uranium until this solution reaches the neck of the bottle. The latter is then shaken, and placed upon a shelf exposed to the light. In about two days, the starch on that side of the bottle which is turned towards the window of the apartment, is found to have taken a purple rose colour, whilst the starch on the opposite side of the flask has remained perfectly white. In about a week, this coloration is very intense, and occupies every part of the flask to which light can have access. This phenomenon is in every respect similar to the production of the green-colouring matter in plants, which have been rendered colourless from having been kept for a long time in darkness, and are then again exposed to the influence of sunlight.

At a late meeting of the Academy of Sciences, at Vienna, M. J. Bohm communicated to the members present a paper on vegetable physiology, entitled, "*On the formation of Chlorophylle (the green-colouring matter of plants) in plants that are deprived of the influence of light.*" The author should have made use of the term *visible light;* his work tends to prove that the *invisible rays* of the solar spectrum are capable of determining the production of chlorophylle in vegetable cells. The chlorosis (or whitening) of plants, according to M. J. Böhm, does not appear to depend so much upon a want of light as upon a defect of vital force. "Each species of plant," he observes, "requires for its normal existence a given quantity of vital force; the want of this, as well as its excess, is injurious, and the geographical distribution of any vegetable depends essentially on it."

M. l'Abbé Laborde, who devotes much of his time to photography, has repeated some of M. Niépce's experiments, with the most satisfactory results. He has recorded them in a short paper addressed to the *Société Français*, entitled—"On the persistent intensity of light."

A paper imbibed with tartaric acid, and exposed to the sun, was then made to line a tin box, and the whole placed in the dark; when a photographic paper was applied for ten or twelve hours to the opening of the box, an impression was obtained as in M. Niépce's experiments. It is known that the latter observed, some time back, that a sheet of glass prevented the action of the solarised paper upon the photographic paper. M. Laborde has made the curious remark, that if this glass be not perfectly clean, the photogenic action will take place through it, as if no glass intervened. The author has varied his experiments in different manners, and comes to the conclusion that the effects are not due to luminous radiations, but to the emanation of some volatile body which acts upon the photographic paper. M. Laborde thinks that the volatile body in question is *formic acid*, formed at the expense of the tartaric acid in the paper by oxydation. This explanation appears probable enough, from the following experiment:—A concentrated solution of tartaric acid is mixed with peroxide of lead, and the bottle closed with a strip of litmus paper, and a strip of photographic paper affixed to a sheet of glass. The whole is placed in the dark, and in a very short time, the blue litmus paper is observed to have become red, and the photographic paper brown.

It has been asked, how could formic acid be present in experiments where M. Niépce employed nitrate of uranium, and no tartaric acid? I suppose that in this case the formic acid is derived from the paper (cellulose) employed in the experiment; and this being the case, it is evident that ozone has been in play, *i. e.*, that part of the oxygen contained in the insolated tube is transformed into ozone by the influence of light.

M. Laborde publishes also in *Le Cosmos* a note upon focusing with diaphragms of different size.

On the night of the 28th of August we had a splendid aurora borealis, which occupied the whole northern portion of the Parisian heavens. I perceived it as early as half-past one at night; it was not, however, observed by any of our meteorologists till a little after two. M. Lurive, an *employé* of the Post-office, perceived it, however, as early as a quarter past one. It appeared as an immense cone of red light, with a wide basis extending from the northern horizon to the zenith, and presenting numerous brilliant semicircles. It was still visible, though feeble, when morning dawned. M. Coulvier-Gravier has presented to the Paris Academy a full account of it, though, unfortunately, he only saw it for the first time at a quarter past two, when the beauty of the phenomenon had considerably decreased.

During this phenomenon, and, indeed, many hours before it became apparent, the alarums in the telegraphic offices were frequently rung, and the dispatches interrupted without the slightest appreciable cause.

M. Quetelet communicated by telegraph the following dispatch from Brussels the next morning:—"Aurora borealis from midnight to half-past one in the morning; intermittent currents on all the telegraphic lines. The submarine cable from Ostend to Dover has been all morning charged with fluid; the service between Brussels and London is almost impossible by that line."

A certain movement of translation was observed in this aurora; some say its centre evidently moved from east to north. M. Colvier-Gravier says it appeared to move from W.S.W. to E.N.E., but that the translation was very slight. He asserts that it was the finest aurora he ever witnessed, and that it must have been seen over a great part of Europe. A telegraphic dispatch from Rome assures us that it was, in fact, witnessed also at the observatory of Rome about three o'clock in the morning. At Lisbon, great perturbations of the magnetic needle have been observed.

Ever since the phenomenon of which I speak, the weather in Paris has been very cold, wet, and windy,—in fact, true

equinoctial gales. To-day (4th September), the influence of the aurora on the weather appears to have ceased.

M. G. Quincke has lately discovered that by passing water through a diaphragm of porous earth, such as hard-baked clay, &c., an electric current is immediately developed. His apparatus consists of a glass tube, open at each extremity, in the middle of which he places the diaphragm; two platinum conductors are disposed in the tube, one on each side of the clay; these conductors communicate directly with a galvanometer. The tube being filled with distilled water, this liquid is made to pass through the diaphragm by means of pressure or suction; in a moment an electric current becomes manifest by the movement of the needle in the galvanometer.

Whatever substance be employed as diaphragm—clay, silk, linen, ivory, sand, &c. &c., the electric current observed has always the same direction as the current of water. Any other liquid may be employed. The intensity of the electric current produced appears to be in direct relation to the degree of pressure employed to force the liquid through the diaphragm. Taking, as an unity, the electromoter force of one Daniel element, that which is developed in M. Quincke's apparatus with a pressure of one atmosphere = 0·27.

M. Elie de Beaumont informs us that the clays from which M. Deville extracted vanadic acid, as mentioned in my last letter, belong to the tertiary formations.

The clays of Gentilly, from which M. Beauvallet has extracted the same substance, belong to the same geological formation. The process which M. Beauvallet employs to extract vanadic acid from clay is as follows:—The substance is boiled with 3 per cent. of carbonate of soda for some hours. The liquid is then filtered. The filtrate contains silica, alumina, and nearly all the vanadic acid. It is sursaturated with sulphuric acid, then with ammonia, and, after a little while, sulphydrate of ammonia is added. After the liquid has reposed for two hours it is filtered to separate the silica and alumina. The filtrate contains the vanadium, as sulphovanadiate of ammonia; an excess of acetic acid is added which precipitates sulphide of vanadium, especially if the liquid be heated to boiling point. By roasting this sulphide at a red heat vanadic acid is obtained.

Another process is also given:—The soda solution obtained in the first instance, may be boiled with a slight excess of hydrochlorate of ammonia until no more ammonia is evolved; the liquor is filtered to separate the silica and alumina, and a solution of tannin added, which determines the formation of a voluminous precipitate of tanate of vanadium, which has a fine bluish black colour. This, when calcined at a red heat in contact with the air gives vanadic acid.

M. Terreil, by treating in the manner described above different varieties of clays from the environs of Paris, has found no vanadic acid, but pretends to have extracted notable quantities of titanic and tantalic acids from them.

Photographic Notes and Queries.

SUBSTITUTE FOR A GLASS ROOM.

Sir,—The difficulties your correspondent "B. C. H." has encountered in his endeavour to copy Mr. Doubleday's tent, are such as might have been anticipated, and as we have been using calico as a substitute for a glass room for nearly six years, perhaps our plan may assist him.

We have a large sheet of *strong* but *fine* white calico five yards square bound with strong binding and having loops at regular intervals; this we draw over three lines so arranged as to give the requisite slope to the roof, and we fasten it by means of strings attached to the loops, or to nails driven into an adjacent wall. Immediately over the head of the sitter is a breadth of *black* calico also drawn tight over the lines to shut out any light from behind or just over the head. To get the requisite *chiaro oscura*, advantage may also be taken of a wall, or a dark cloth may be hung on one side and a light one on the other, and the top cloth turned back and drawn over at pleasure, and if the slope of the roof be sufficient, the rain which finds its way through is really unimportant, except in *very severe showers*, as, when strained tight and wet through, it acts as an umbrella, and is almost as transparent as glass. Such a cover might be used with advantage over the frame which "B. C. H." has made.

We frequently take portraits under such a cover in from one to two seconds, and the expense is very little, as the cover will last two or three years.

Our background is a frame jointed like an embroidery frame, so as to be quite portable; over this we stretch a large cotton "blanket sheet;" over this another made with loops and strings and dyed drab, serves when a darker background is necessary. This plan may, perhaps, serve your correspondent "G.S." (vol. ii. p. 216.) H. & J. Walter.

P.S. The transfers sent on a previous occasion were taken under the cover described.

538, *New Oxford Street, W.C.*

WATERMARKINGS IN THE FOTHERGILL PROCESS.

Sir,—In reply to "G. M." respecting the watermarkings on the plates, I think they are caused by imperfect dilution of the bath solution, causing the albumen to coagulate irregularly. I am convinced of the cause, and also of the remedy, as I can produce or leave them out at pleasure. I proceed thus: the sensitising bath consists of 35 grains of fused nitrate of silver; 1 ounce rain water; ½ minim glacial acetic acid; drain the plate, then immerse it in the diluting bath, consisting of 2½ grains of fused nitrate of silver; 1 ounce rain water; to be used in an ordinary dipping bath, always observing to dip the plate the same way as in the first, or sensitising bath; raise the plate two or three times during half a minute, drain for a few seconds on a piece of blotting paper, then pour the albumen on the *top edge*, letting it flow to the bottom (I use 1 ounce new albumen; 3 ounces rain water; 20 grains of chloride of sodium or ammonium; 2 grains camphor; filter through paper before use); drain and wash in a well bath or dish, that the water may flow in a uniform sheet on the surface of the plate: I prefer drying by artificial heat in a deal box; also store them in much abused deal boxes, as I find them after seven months' inclosure as active as when first prepared. The time of exposure is, in sunlight, 30 seconds, with a view lens, 8-inch focus, ¼-inch stop. I develop with 12 grains protosulphite of iron; 10 grains of acetate of soda; 20 minims glacial acetic acid; 10 minims alcohol; 1 ounce water.

Knostian.

TABLE OF NECESSARIES FOR BEGINNERS IN PHOTOGRAPHY.

Sir,—Thinking a list of necessaries might be of use to persons commencing photography, I send the inclosed for your perusal. I have taken the processes as under:—

No. 1. Wet collodion.
No. 2. Wax paper.
No. 3. Calotype.
No. 4. Collodio-albumen.
No. 5. Printing.

To explain the list. The prices given are about the usual charges, though they may be slightly cheaper or dearer. The rows of numbers indicate that the articles opposite are necessary for that process; thus "... 2 ... ..., iodised wax paper," means that it must be had for process No. 2. Again, "1 ... ... 4 ..., levelling stand," means that it can be used for collodion or collodio-albumen.

In the quantities of chemicals, I have taken a small plate (5 × 4), as that is better for beginners, and also is about the stereoscopic size (6¾ × 3¼). Where two occur, as "10 oz. bottle of collodion," it means that there should be a different sample for processes 1 and 4.

As better for learners, I have supposed articles such as collodion, iodised paper, &c., to be purchased ready prepared.

On commencing photography, it is necessary to have for every process—

Bottle for nitrate of silver, 4s. per oz.
Bottle for glacial acetic acid, 6d. per oz.
Bottle for hyposulphite of soda, 8d. per lb.
Vessel for distilled water, 6d. per gallon.
Blotting paper (white), 1s. per quire.
Filtering paper, 1s. per 100.
Box, scales, and weights (glass pans), from 5s.
One measure, graduated by drachms, from 1s.
One measure, graduated by minims, from 1s.
Funnel for nitrate solutions (glass), 1s.
"Photographic News."

For every process except printing—

Camera.
Camera stand and screw.
Lens.
Focusing cloth.

For.					Apparatus.
1	...	...	4	...	Levelling stand, 2s.
1	...	...	4	...	Developing funnel, 1s.
1	...	...	4	...	Bath and dipper (different ones for 1 & 4), from 4s.
1	...	...	4	...	Waste dish, 1s.
1	...	...	4	...	Six clean cloths for cleaning plates.
1	...	...	4	...	Chamois.
1	...	...	4	...	Developing glass, 1s.
1	...	...	4	...	Plates, 1s. per dozen.
...	2	3	4	5	Two washing dishes, 1s. each.
...	2	3	...	5	One pair horn pliers for nitrate solutions, 1s.
...	2	3	...	...	,, ,, ,, ,, ,, gallic ,, 1s.
...	2	3	...	5	One dish for silver solutions (glass), 2s. 6d.
...	2	3	...	5	,, ,, ,, hypo ,, 1s.
...	2	3	...	...	,, ,, ,, develop. ,, 1s.
...	2	3	...	...	Funnel for gallic ,, 1s.
...	2	3	...	...	Portfolio.
1	...	...	4	...	Plate box, 3s. 6d.
...	2	3	4	...	Yellow bag.
...	...	3	...	...	Exciting board, 2s.
...	...	3	...	...	Glass rods, 1s.
...	2	...	...	...	Iodised wax paper, 11s. per quire (17 × 11).
...	...	3	...	...	,, paper, 3s. per dozen.
...	...	...	...	5	Albumenised paper, 5s. 6d. per quire (17 × 11).
...	...	...	4	...	Funnel for albumen, 1s.
...	...	...	...	5	Pressure frame, 5s.
...	...	...	...	5	Toning bath dish, 1s.

					Quantities for 50 pictures of 20 sq. inches each. 1.	2.	3.	4.	5.	Chemicals.
1	...	...	...	...	10 oz.	...	...	...	...	Bottle of collodion, 7d. per. oz.
1	...	...	4	...	1 dr.	...	...	1 dr.	...	,, Pyrogallic acid, 1s. per dr.;
1	...	...	...	...	2 oz.	...	...	...	...	,, or protosulphate of iron, 1d. per oz.
1	...	...	4	...	2 oz.	...	...	2 oz.	...	,, varnish, 1s. per oz.
1	...	...	4	...	2 oz.	...	...	2 oz.	...	,, tripoli, 3d. per oz.
1	...	...	4	...	2 oz.	...	...	2 oz.	...	,, alcohol, 6d. per oz.
...	2	3	...	...	...	4 oz.	4 oz.	...	...	,, gallic acid, 1s. per oz.
...	2	3	...	5	...	4 oz.	4 oz.	...	5 oz.	,, cya. potas., 3d. per oz.
...	...	...	4	...	...	...	...	2 dr.	...	,, iod. potas., 1s. 6d. do.
...	...	...	4	...	...	...	...	2 dr.	...	,, bro. potas., 2s. do.
...	...	...	4	...	...	...	...	1 dr.	...	,, iodine, 1s. 6d. per oz.
...	...	...	4	...	...	...	...	1 oz.	...	,, liquor ammonia.
...	...	...	4	...	...	...	...	10 oz.	...	,, collodion, 7d. per oz.
1	...	...	4	...	...	...	...	...	...	Bottle for develop. solu., 4 oz.
...	2	3	...	...	...	...	...	...	...	,, ,, ,, 4 oz.
1	...	...	4	...	...	...	...	...	...	,, cleansing ,, 2 oz.
...	2	3	...	...	...	...	...	...	...	,, fixing ,, 10 oz.
1	...	...	4	...	...	...	...	...	...	,, ,, ,, 4 oz.
...	...	...	...	5	...	...	...	...	...	,, ,, ,, 10 oz.
...	2	...	...	...	...	...	...	...	...	,, exciting ,, 10 oz.
...	...	3	...	5	...	...	...	...	...	,, ,, ,, 10 oz.
...	...	...	...	5	...	...	...	...	6 gr.	,, chl. gold, 8s. dr., 1 oz.
1	2	3	4	5	...	...	...	...	...	Kaolin, 3d. per oz.
...	...	3	...	...	...	...	...	...	...	Wax, 3s. per lb.
					12 dr.	2 dr.	2 dr.	12 dr.	3 dr.	Bottle of nitr. silver, 4s. per oz.
					2 oz.	1 oz.	1 oz.	3 oz.	...	,, glacial acetic acid, 6d. per oz.
					8 oz.	4 oz.	4 oz.	8 oz.	4 oz.	,, hypo. soda, 8d. per lb.

ARTICLES USEFUL, BUT NOT ABSOLUTELY NECESSARY.

1	2	3	4	5	Still.
1	2	3	4	...	Bottle of nitric acid.
1	2	3	4	...	Level, 3s.
1	...	...	4	...	Plate holder, 4s.
1	2	3	4	5	Spirit lamp, 2s.
1	2	3	4	5	Funnel stand.
1	...	...	4	...	Stock collodion bottle.

H. S. I.

REVERSED ACTION OF LIGHT.

Sir,—I have just returned from a photographic tour, and on Saturday developed a few of my pictures, which were prepared by "Long's" process, and I was very much surprised to find that of ten plates five came out as positives, when viewed by transmitted light. They are not so perfect as your correspondent's "W. H. B.", but still the detail in one is tolerably good. I thought at once that they had been over-exposed and have shown them to several friends, who confirm my opinion. I never obtained direct positives in the camera before, though I have often over-exposed my negatives. I suppose now there is no way of using the pictures as negatives. C. H. Paine.

METHOD OF INTENSIFYING NEGATIVES.

Sir,—In No. 47, vol. ii., of the "Photographic News," I saw a process of intensifying negatives, given by your correspondent, Mr. Overton. I have tried the process, but in every instance I have had the misfortune to spoil the picture by the film parting from the glass. I have run the strip of varnish round as recommended, still with the same result, as it then parts from the centre. Will your correspondent assist me over this difficulty by informing me of the cause?

J. D.

CONVERTING POSITIVES INTO NEGATIVES.

Sir,—I should be very much obliged to your correspondent, Mr. Robert John Fowler, to be informed if it is necessary to use the fixing hypo. solution after the positive has been treated with the iodine solution and pyrogallic. Neither Mr. Fowler, in his letter in your last number, nor Mr. Hardwich, mentions if such is necessary. S. B.

ANSWERS TO MINOR QUERIES.

Developing Solution for Collodio-Albumen Plates.—*X.* We think you will find the following plan better than the one (with pyrogallic acid) which you have hitherto adopted:—Make a solution of 100 grains of gallic acid in 5 ounces of dilute alcohol (equal parts of alcohol and water), and, after filtering, preserve it for use in a clean stoppered bottle. Next prepare a solution of 25 grains of nitrate of silver in 4 ounces of water, and add half an ounce of glacial acetic acid to it; preserve this in another stoppered bottle; they will each keep good for an indefinite time. Equal parts of these two solutions mixed together form a very excellent developing solution for plates prepared by almost any of the dry processes. The image will not appear so rapidly as with a pyrogallic developer, but there will be a much less liability to stains; and, if the plate be supported during the time of development on a levelling stand, the little extra time thus occupied will be of no consequence.

Preservation of Solution of Gum Arabic.—*S. C. O.* If your gum arabic solution is prepared merely by solution in cold water, it will turn sour after it has been kept for a week or two, and, in that state, will exercise a very prejudicial effect upon the permanence of any photographs which are mounted with it. The addition of a lump of camphor, about the size of a pea, to each ounce of the mucilage, will prevent its turning sour; but a better plan will be to heat the solution to ebullition as soon as the gum has dissolved, and, after boiling for a minute or two, to filter from any undissolved particles. It will now keep sweet for any length of time, possessing, in this respect, an advantage over starch, isinglass, gelatine, or similar substances, which are sometimes used for the purpose of mounting photographs. In answer to your question as to whether gum arabic is the best substance to use for this purpose, we think it is; if not the best, at all events, as good as any of the kind. The best cement in our opinion is, however, the solution of india rubber in benzol, as recommended in previous numbers.

THE STEREOSCOPIC EXCHANGE CLUB.

In accordance with the desire of many of our subscribers, we publish below a fresh list of those among them who are desirous of exchanging stereograms.

We have been favoured by correspondents with sundry suggestions, some of which, otherwise very excellent, would have the drawback of involving a great deal of trouble and loss of time, if adopted; while others would probably bring upon us the imputation of being actuated by personal motives, and are, therefore, impossible of adoption. There is, however, one suggestion which recent complaints induce us to think it would be advisable, in the interest of the general body of our readers, should be carried into operation. This suggestion is as follows:—That every gentleman who desires to have his name placed on the list, should send us a specimen of the different prints he proposes to exchange, in order that we may have evidence that they are not of the quality of those which were sent by at least one person of those who comprised our last list.

As this suggestion appears to us both advisable and feasible, and not requiring the sacrifice of much time, we propose that each gentleman, on sending his name, shall, at the same time, send us specimens of his prints; the appearance of his name in the list, under these conditions, will be a guarantee to those who desire to exchange, that the pictures they will receive in return will be, at least, of average merit. We do not, of course, desire those who have a large number of negatives to send us proofs of each, but only such as he may think necessary to give us a fair idea of their merit.

As regards the proposition to extend the system of exchange to larger photographs as well as stereoscopic pictures, we do not see why the same rules should not apply to one as the other. We therefore intend to print a separate list of those who are prepared to exchange large photographs, giving the dimensions of the print; and the fact of the name of the photographer appearing in this list will be a guarantee to those who desire to exchange with him that his picture is of fair average excellence, if nothing more.

It appears to be the general opinion that, on the whole, it is more convenient, as well as safer as regards freedom from injury in their transmission through the post-office, to send the stereograms unmounted; it will, therefore, be optional with those claiming an exchange, to send them mounted or unmounted, it being, of course, understood that any gentleman who receives a mounted picture, shall send a mounted one in return; and when unmounted ones are sent, they should also be *untrimmed*, as gentlemen who wish to mount them themselves, might also prefer to cut them to a uniform shape or size.

We are of opinion that it would be of great advantage were each person to write on the back of the picture, if mounted, or on a separate slip of paper, if unmounted, the name of the scene, date, and hour when photographed, time of exposure, process employed, maker of the lens, together with its length of focus and other description, size of the aperture, state of the light, and separation of the lenses; by this means very valuable information would, in time, be afforded, as to the comparative merits of different lenses, processes, &c.

A. F. Stafford, 2, Alderson-street, South Shields.—Alex. Nicholson, Dun-Edin Villa, Highbury New Park, London.—W. Child, Bushbury, Wolverhampton. —H. Haakman, Amsterdam.—J. H. Jones, 12, Williams-street, Swansea. —John Rookledge, Easingwold.—W. Brooks Reynolds, The Elms, Farringdon, Berks.—Dr. Towers, Hertford.—J. C. Twyman, 65, High-street, Ramsgate.—H. Hawker, Menheniot, Liskeard, Cornwall.—Count Wengierski, Osborne House, West Malvern.—Louis D'Elboux, Freemantle, Southampton.—Henry Bath, Longlands, Swansea.—J. W. G. Gutch, Tenby.—A. Copsey, Long Melford, Suffolk.—Wm. Stonehouse, 4, Abbey-terrace, West-cliff, Whitby.—Capt. Baxter, Mancetter Manor, Atherstone.—J. S. Overton, Crowle, near Bawtry.—J. Heywood, 2, Willow-terrace, Moss-side, Manchester.—Frank Howard, 12, Whittingham-villas, Studley-road, Stockwell. —T. W. Coffin, Jun., Post-office, Devonport.—Henry Moore, Keastwich, Kirkby Lonsdale.—H. Higgins, Stamford.—C. Steven, White-lodge, Whitehead's-grove, Chelsea.—J. Partridge, 146, High-street, Southampton.—Alex. Henderson, 3, Inkermann-terrace, Montreal, America.—David Storrar, Jun., High-street, Kirkaldy.—R. Mason, Bamber-bridge, Preston.—F. Walker, 34, Crosby-street, Maryport.—J. S. Brock, Chestnut-cottage, Heacham, near Lynn, Norfolk.

TO CORRESPONDENTS.

With the next number will be presented a large sized copperplate photoglyphic engraving, expressly prepared for the "Photographic News," *by Mr. H. Fox Talbot.*

The commencement of a new series of articles on "The Art of Photography Practically Treated," from the pen of Mr. Alexander Watt, will also be given in the same number.

J. H. Jones.—We rememember distinctly receiving the pictures, but *no* letter accompanied them. We will do our best to find out who was your correspondent whose pictures and letter you lost without having answered; perhaps if he reads this he may give you an opportunity of communicating with him. We should be very pleased to receive the account you mention, and also your new prints. You should prepare your own plates by the Fothergill process, and you would, doubtless, find it successful in giving you the views of the interior you require.

H. J. J.—Pack the plates in pairs, with the sensitive surfaces facing, and prevented from touching by a narrow strip of thin paper at the edges; between each *pair* so packed a sheet of paper the size of the glass may be placed, and the whole may be tied up in packets of one or two dozen; first in fine paper, well gummed at the folds, to keep out the air, and then in several folds of thick brown paper.

W. B. R.—The picture has arrived quite safe. It is a very good view; but as you ask us our opinion of your pictures, we must say that we think you give far too much foreground. The sliding front of the camera should be raised until the excess of foreground is cut off. We prefer to see two-thirds of the picture sky, and one-third only landscape; of course, supposing that the view is of a tolerably flat country.

J. P.—We have to thank this correspondent for some of the most beautiful stereograms we have yet seen; indeed, it is difficult to imagine that it is in the power of photography, as at present known, to surpass them. We do not wonder at our correspondent not having profited by the exchanges which he has made; we know of only two photographers in England whose works would be a fair exchange for those of J. P.

A Country Subscriber.—The lime, or oxycalcium, light would be best for a magic lantern; the photogen would not do, as it only lasts a few seconds. Gas or oil will not give a very bright light for such purposes. We think, if gas is used, a "Leslie" burner is the best. Your query about ox gall we will answer in a future number. Consult our advertising columns. Glass transparencies for the stereoscope would be most suitable.

J. S. B.—Do not on any account give up your twin lens camera for one with a single lens; that would be a retrograde step. We think the great advantages derived from having the two pictures taken at the same moment far overbalance the loss of exaggerated stereoscopic effect. Most of the pictures we have received would have been improved had two lenses been used.

S. S. B.—We quite agree with you, that the prints you inclose are such as ought never to have been sent to any one. One of the producers has not been a member at all. We trust now that there will be no necessity for any complaints, as all the pictures which have been sent as specimens are up to, or above, the average.

W. C.—The plan you propose (printing the list in column form) would occupy more space than we could give. Of the five prints inclosed, Nos. 1, 2, and 4 would be very good, if properly printed. Your silver is, however, too weak, and thus there is a disagreeable granular appearance on the surface of the prints.

A. Taylor may treat the solution he speaks of in the way recommended by Mr. Watt for recovering silver from old toning baths, and the "brown stuff" he refers to may be worth reducing, as it is probably a salt of silver: it should, therefore, be collected, when reducing the silver, and treated with it.

S. Artridge.—The price of Herapath's Chemistry is 1s. each part. We think the other book you inquire about will cost 3s. 6d. Hardwich is decidedly the best. The dictionary you mention is not such as we can recommend.

H. H.—The large specimen print was received in safety, and would have been acknowledged last week had it not been delayed for a short time on the road. As soon as a sufficient number of names are received the list will be published.

G. C. T.—Is it not possible that some other circumstance may have prevented your communication being attended to? We should be very unwilling to think that any member of the Club would be guilty of so uncourteous an act as you name.

H. S. I.—We are always glad to receive any of "H. S. I's." useful memoranda. If you have quite got rid of the smell of the naphtha used as solvent, the remaining shellac would not injure the plates. Large prints had best be sent through the post unmounted, and rolled round a wooden cylinder.

W. Sterne.—We cannot venture to advise on such a point. Not, however, for the reason you imagine, but we really do not know to whom we could conscientiously recommend you to apply. The sum you name is too small to purchase anything very good.

Bristolian.—Increase the distance between the lens and focusing glass, at the same time bringing the object you wish to copy nearer the lens. By this means you can obtain any sized copy you like. See Mr. Sang's paper on a copying camera in a recent number.

L. D'E.—If you, or any other member, forward to us a complete set of pictures, with an intimation that they are for review, we shall not object to do so, but without such request it would be a breach of confidence to make public mention of them.

A. F. S.—There would be many objections to the plan you propose. We do not wish to exert a more rigid censorship over the exchanges than is absolutely necessary.

Spx.—It could not possibly succeed, as *each* eye would be in *both* images. For a stereoscopic effect to be produced, each eye should only see the one image intended for it.

C. E. W. H.—Do not use much friction in cleaning the plates, or they will be liable to scratch. The picture should be varnished on the front only. No difficulty should be experienced if good varnish were employed.

J. Rookledge.—The three stereograms which you forwarded are very excellent, and quite equal, if not superior, to the average specimens which we have received. See the answer to "J. W. G. G."

J. C. T.—A small rolling press can be obtained for about £5, which is used by many photographers to give a highly glazed surface to stereoscopic and other prints.

T. H.—The specimens have not yet arrived. We shall be pleased to see them, and also to receive the particulars of the new effect you have succeeded in producing.

W. J. W——n.—You should use the proper varnishes advertised for such purpose, and you would not then meet with such a mishap. Their preparation is a trade secret.

An Amateur Optician.—No trustworthy particulars have, as yet, been communicated to the world by the professor.

C. R.—Consult the two very copious indexes which have been respectively given with Nos. 26 and 52.

R. M.—Your suggestions are received with thanks; we have, as you see, availed ourselves of them.

J. W. G. G.—We hope you will not have so much cause of complaint in future. The list has been curtailed a little.

A. H. W.—We are much obliged by the kind intentions of our correspondent, but the information has already appeared in the "Photographic News."

H. W. L.—A. C.—J. S. O.—R. M.—and J. H., Jun.—Received.

Communications declined with thanks.—Tourist in the South.—Pedes.—O. O. O.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—G. W. R.—Flock.—P. Q.—An Old Beginner.

In Type:—J. N.—B. M. Brakenridge.—M. A. Root.—W. H. Burnand.—G. A. M. —A. Watt.—G. R.—J. S. Overton.—W. L.—G. H. W.—I. W. W.—Inquirer.—One in a Fix.—H. M.—A Young Beginner.—Iota.—M. Van Monkhoven.—A. N.—J. W. Love.—F. M.—P. S.—P. H. D.—J. T.—H. M. —W. S.—C. S.

Cases for Binding Volume II. have been prepared, price 1s. 6d. each. Subscribers may have their copies bound by the Publishers, in the usual manner, price 2s., including the cloth case.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 54.—*September* 16, 1859.

With the present number we have the pleasure of presenting to our readers a photoglyph from a plate engraved by Mr. Fox Talbot.

As we stated last week, the picture represents a portion of the Palace of the Tuileries; and from the richness of the sculpture, the number of the statues, and the numerous fluted columns, is an exceedingly difficult subject to engrave by a chemical process, owing to the great variety of tints it presents, and we may therefore point to this photoglyph with confidence as a proof of the great value of Mr. Talbot's process. The superiority of this print over those which we were enabled, by the kindness of the inventor of the process, to present to our readers some months back, does not consist so much in the more accurate delineation of details, as in the evidence it affords of the capability of this kind of engraving to render the most delicate gradations of tone as perfectly as the bolder outlines of the picture; besides which, it proves that the process is available for the reproduction of large subjects as well as for small ones.

Most of our readers are, doubtless, acquainted with the many and valuable discoveries made by Mr. Fox Talbot in photography. To him we owe the discovery of the method of producing a positive picture from a negative; photography on paper; and the development of the image by gallic acid, beside other discoveries in the art, which have been crowned by this last discovery of photoglyphy.

We believe that the photoglyphic process is the only one by which a plate can be engraved without being "touched" by the professional engraver. We have never heard it seriously claimed for M. Charles Nègre, that the plates he has occasionally exhibited as specimens of heliographic engraving, are really such, except in a limited sense. It may therefore be stated positively, that at the present moment there is no process known by means of which a metal plate can be engraved entirely by chemical action, and with equally perfect results, as by the photoglyphic process.

It appears to us that in this discovery the long sought-for carbon process is found. There can be no sort of question that prints from a photograph on a steel or copper plate are permanent, since they have the same guarantee of permanency as the print of our books, which has already endured in some cases for a very great number of years; and this cannot be said of the so-called carbon prints exhibited at the competition for the Luynes prize, to say nothing of the inferiority of these latter in an artistic point of view. The extent to which a plate engraved by this process may be made available, is almost unlimited. The plate from which the photoglyph we give away this week was printed is of copper. This, after being engraved by Mr. Fox Talbot, was steel-faced. The result of this process is to give us a plate which might be used for printing any number of proofs, on the simple condition of having the steel-facing renewed as soon as the present coating of steel shows signs of wear.

By means of photoglyphy a fac-simile of any rare engraving or manuscript may be multiplied to any extent, with the certainty that these fac-similes are not liable to fade. A most important consideration in estimating the value of this discovery is the extreme comparative cheapness with which, by its means, perfectly stable photographs of paintings or other works of art may be produced. A photograph at present is a somewhat costly article, which necessarily follows from the expensive nature of some of the chemicals employed, and the time and labour involved in its production; but when photographs can be printed with printers' ink, with the same facility as from a metal plate engraved in the ordinary manner, without the preliminary cost of engraving, there can be no reason why the most beautiful prints should not be sold at a price but little above the cost of the paper on which they are printed. Not only has this method of engraving a vast advantage over the ordinary process as regards cheapness, but it has the additional and most important advantage of giving a perfectly faithful reproduction of the scene or object without omitting the most minute details. In proof of this, we may refer to one of the photoglyphs we issued to our readers some months back. This was a view of the Place Henri IV., from the opposite side of the Seine, the photograph being of such small dimensions that the inscriptions on the fronts of the houses could not be distinguished with the naked eye; yet, on the application of a magnifying power, we obtained the information that one of the buildings was that in which M. Chevallier, optician, carried on his business operations; and another, that in the occupation of M. Secretan, who is described as an *ingenieur opticien.* This microscopical minuteness of delineation will render it of great value in the reproduction of anatomical photographs—a matter in which every individual may be interested. The cost of a complete set of photographs of all the various organs, &c., of the human body, taken by the ordinary process, would be so expensive as to place them beyond the reach of most medical men just commencing practice, which is the very time when they most need to keep the knowledge they have acquired fresh in their memory; but when multiplied by this mode of printing, cheapness would be secured without the slightest sacrifice of accuracy or minuteness.

In reproducing photographs of maps, either on a large or reduced scale, it is calculated to be of essential service. This branch of photography is practised now to a considerable extent, but at a cost which would be very materially lessened by employing the photoglyphic process, because for all commercial purposes the reduced or enlarged photograph has to be copied by the engraver on a steel plate, which is rendered unnecessary by the process under consideration. We beg to call the attention of the Government to this circumstance. There are excellent photographers in the Government service who are perfectly able to test the value and

utility of this process, and a small portion of the sum annually expended in photographic manipulations in the different offices, would be sufficient to prove the superior advantages of the photoglyphically engraved plate over the ordinary glass negative.

To sum up the advantages of this discovery: we may say that it gives the power of producing an unlimited number of photographs of an object at an exceedingly small cost, and of undoubted permanency, whether this object be a painting, a statue, a map, or a rare engraving or manuscript. It has also the additional advantage over the ordinary photographic printing process, that the picture once on the plate, the state of the weather afterwards is a matter of no importance.

PHOTOGRAPHY IN NATURAL COLOURS.*

BY M. E. BECQUEREL.

I next thought of trying the preparation of chloride of silver, by acting on a piece of silver by means of chlorine, either in the form of gas or in solution. I tried at first exposing a sheet of silver to the action of chlorine gas, which rendered it a grey white, and on projecting the solar spectrum on its surface no particular phenomenon was observed, only that a grey tint appeared in the violet, thus exhibiting a chemical reaction. I then tried the sheet of silver with the chlorine emanating from chlorine water, or, still better, by plunging it into chlorine water itself. The blade, having remained in the liquid for several minutes, became covered with a layer of a greyish white tint, and the action of light became very different. After having projected the luminous spectrum upon it for several minutes, on withdrawing the sheet, and examining it by daylight, I perceived a *souvenir* of the spectrum fixed upon it, whose tints corresponded exactly to the luminous parts of the solar spectrum. The place where the red had struck was pale red, the yellow was yellow, and the blue blue, &c. On restoring the blade to the same position and allowing the action of the spectrum to continue for some time longer, these effects disappeared; and there finally remained a grey tint over the whole portion struck by the spectrum. I then saw that it was not a simple coincidence of tint which had given to the chloride of silver previously sensitised the red colour on one side of the spectrum and violet on the other; but that in this case, the unchanged white chloride was probably mingled with sub-chloride, that is to say, with chloride having one equivalent of chlorine less than the white chloride, and that this latter substance had occasioned the tints observed.

I then substituted for the chlorine water some solutions containing chlorine capable of contributing this element to a sheet of silver, and obtained, as with the first solution, surfaces capable of reproducing the image of the spectrum with its colours. That which was most successful, and which I published in 1848, when I published my first experiment,† was a solution containing chloride of copper. The following preparation is very easily obtained:—Take commercial sulphate of copper, and chloride of sodium. Mix these two salts in excess, in a precipitating glass, with a certain quantity of water; the solution is performed with production of a double reaction, and chloride of copper is the result. One part of this liquid should be mixed with one part of a solution of marine salt and six parts of water. It is then sufficient to plunge a plate of silver into this liquid in order for it to rapidly assume a violet tint attributable to the presence of a slight layer of chloride of silver, and for it to become susceptible of the action of the spectrum, of which it will reproduce the principal colours. The sheets of silver used should be of the greatest purity, because this process shows the slightest traces of other substances which may be upon their surfaces. I should mention, however, that this mode of preparation, although simple, does not admit of increasing at will the impressionable layer. I have therefore entirely abandoned it in my other researches,* to substitute for it a mode of preparation which allows the layer obtained to exhibit results still more remarkable, and to have as much thickness as may be required. This process consists in applying by degrees by the action of electricity to the surface of the plated surfaces, chlorine in a nascent state, which affects the silver, and produces the impressionable layer. In order to make this preparation take a well-polished plate of silver and cover the back by means of a spirit varnish, so that there remains only the surface of silver as a conductor of the electricity, and upon which the chlorine may act. This plate is attached by means of copper hooks to the positive conductor of a voltaic battery of one or two elements, and to the negative pole is fastened a wire or piece of platinum; the plate of silver and the platinum are both plunged into a mixture of eight parts of water and one of hydrochloric acid. The chemical action of the electric current produces hydrogen upon the platinum, and chlorine on the positive pole upon the silver. This latter is then affected, and finally becomes a violet-coloured grey. This tint then deepens, and if the action be continued for some minutes, the plate would become black, as though it had been smoked. Once the plate thus prepared, it is only necessary to lightly polish it with cotton or leather, in order to remove the kind of veil which covers it, and it may be used to reproduce immediately coloured impressions from the action of light. This process of preparation of the chloride is the best that can be used to obtain the reproduction of the images of the spectrum, with all their colours; and, in certain conditions, the images of the camera.

It is a very remarkable fact that the impressioned substance in question is sensitive between the same limits of refrangibility as the retina, and is the only one to be obtained under these conditions. If the solar spectrum be projected upon a plate prepared as just described, the action may be seen to exhibit itself in the yellow and the green; it then takes place on one side near the red, and on the other near the violet, the action being the most energetic in that spot where the greatest light is found. In the red portion the matter assumes a red tint; in the yellow portion a yellow tint; in the green portion a green tint. The blues are very fine, and the violet tint precisely similar to that of the violet of the spectrum. If a beam of luminous red rays be isolated, and allowed to act upon the matter, when the action begins the tint of the sensitive portion becomes red; if the action is allowed to continue, the tint remains the same. By greatly prolonging the duration of the experiment, the matter becomes completely transformed, and there only remains metallic silver where it has been exposed to the light. If a beam of blue rays be used, the same effect is produced. The blue tint obtained upon the surface becomes deeper by degrees; and upon allowing the light to act upon it for a very long time, the tint upon it finally assumes that of metallic silver. The same may be observed with each group of rays, which yield, after an action of a certain duration, a tint of their own shade; but it finally happens, if the reaction be at all complete, that the impressionable matter tends to metallic silver. These effects show, then, that it is not by an action similar to that of the phenomenon of thin plates that the substance reproduces coloured impressions of light, but rather on account of a special action, showing that the curious compound spoken of has the faculty of diffusing rays of the same refrangibility as those which have acted chemically upon it. It is, therefore, necessary to give some indications of its probable composition. Although I cannot speak with certainty, I am led to believe that this matter is *violet subchloride of silver*, that is to say, chloride of silver having one equivalent of chlorine less than the white chloride. By the aid of this hypothesis, this fact may

* Continued from vol. ii. p. 303.

† Travail présenté à l'Académie des Sciences de l'Institut, le 7 Fevrier 1848, et inséré dans les Annales de Chimie et de Physique, 3e série, tome xxii. page 451.

* Annales de Chimie et de Physique, 3e série, tome xxv. page 447 (1849), et même ouvrage, tome xlii. page 81.

be adduced, that in treating this chloride with solutions which dissolve white chloride, such as ammonia, hyposulphite of soda, &c., white chloride is dissolved, and there is always a residue of metallic silver. This subchloride of silver is the only chemically impressionable body which possesses the remarkable property of reproducing the colours of luminous active rays. The iodides, bromides, &c., do not give any colour, and it is only necessary that the chloride should be mixed with a little of these compounds for all colour to entirely disappear. These colours are likewise obtained immediately by the luminous action, and without the use of any developing agent. I ought also to remark that I have obtained this compound on the surface of paper, glass, porcelain, upon collodion, gelatine, &c., but these effects have always been more difficult to obtain, and much less beautiful than upon metallic plates.

(*To be continued.*)

DESCRIPTION OF A PLAIN OR WAXED PAPER PROCESS IN PHOTOGRAPHY.*

BY JESSE MITCHELL, ADJUTANT 1ST NATIVE VETERAN BATTALION.

The amount of exposure for any focal length and aperture being known, the time necessary for any other lens is found by the following rules, viz. :—

With lenses of the same focal length, the time of exposure is inversely as the square of the diameter of the aperture in the diaphragm.

With the same aperture and different foci, the time of exposure is, directly as the square of the focal length.

With different apertures and foci, the times of exposure are, inversely as the square of the diameter of the apertures, and directly as the squares of the focal lengths.

The correct time of exposure, however, is one of the photographer's difficulties, and requires some considerable experience to adjust accurately under every kind of light.

DEVELOPING SOLUTION.

Some hours before it is required to be used, fill a large stoppered bottle with distilled water, put in a piece of camphor the size of a nutmeg, and some gallic acid, the exact quantity is of no consequence, so that it be in excess. Upon an emergency the solution of the gallic acid may be accelerated by putting the bottle (without stopper) in a jug of hot water. The photographer, however, should be careful to have a saturated solution always, or there will be no certainty in his practice.

Filter as much of the above solution into the developing tray as will cover it to the depth of at least one-eighth of an inch, and then examine the state of your negative.

If, by the light of a taper, the outline of the upper part of the buildings or trees,† is just plainly visible, the paper is in the best state for developing, and you should add to the gallic acid about $\frac{1}{16}$ of its volume of the exciting solution. If the sky line is very strongly marked, add $\frac{1}{20}$ to $\frac{1}{24}$, and if the paper has been so long exposed as to bring out the brighter parts of the view, you may perhaps save it by omitting the aceto-nitrate altogether, or even in extreme cases diluting the gallic acid, adding a small quantity of the silver solution, when the detail is nearly all visible; on the contrary, if the sky line be entirely invisible, add $\frac{1}{12}$ of the aceto-nitrate solution.

Tilt the tray to and fro half a dozen times to insure the perfect mixture of the solution, or you will have patches of unequal development.

Float the marked side of the paper on this, as before described, and be careful that no portion of the solution is allowed to touch the back of the paper; should this unfortunately happen, as it sometimes will, notwithstanding every precaution, instantly reverse the paper and wet the whole of the back as the only way to avoid a stain—turning it again (as soon as the back is wetted thoroughly) and developing by immersion. Should there be an insufficiency of gallo-nitrate to cover the paper well, get an assistant to pour in more whilst you hold the paper, replacing it face downwards as soon as the solutions are mixed.

The sky and most strongly illuminated parts of the picture first appear, then the portion more in shade. When the darker parts become visible through the back, lift one end between yourself and the light, if the detail in the least brightly illumined parts is at all visible, take it up and examine it carefully. If satisfied that you have obtained as much detail in the shadows as can be done without too much intensifying the high lights, remove the paper at once to a pan of clean water, and float it face downwards to allow any decomposed gallo-nitrate to fall to the bottom of the pan, then pour off the water, or, what is better, remove the negative to another vessel of clean water. If from the length of time occupied in the development or any other cause, decomposition of the gallo-nitrate has taken place to any extent, the face of the negative may be very cautiously brushed with a small camel's-hair brush. After washing in 4 or 5 changes of water for half an hour, remove it to the fixing solution.

FIXING SOLUTION.

This consists of 3 or 4 ounces of hyposulphite of soda to 1 pint of clean (not distilled) water, in which the negative is to be left until all the yellow iodide of silver is dissolved; this can only be ascertained by daylight, which will not hurt the picture after it has been some time in the solution; still it is not prudent to expose it to too strong a light (such as sunshine) until the hyposulphite has been washed out.

When all the iodide of silver is removed, wash in three or four waters in succession, and then leave it in a large quantity of water for 3 or 4 hours, changing the water every half hour, after which pin it up to dry (pins do no harm now). When thoroughly dry, it must be waxed in one of the following ways.

TO WAX PAPER.

A dish of double block tin, without joints in the bottom, and one inch deep, is made to fit into another and larger vessel, also of tin, containing boiling water which must be kept at the boiling point by any convenient heater. A cake or two of white wax is put into the waxing dish, and when it is melted the sheet of paper is floated thereon. When the paper is saturated with wax, take it up and drain off as much as possible of the superfluous wax. Do the same with any number of papers. Then with a clean box-iron,* iron them one at a time between from 4 to 6 thicknesses of blotting paper until the blotting paper is saturated with wax; then iron between fresh blotting paper, which may require to be repeated. The second and third papers of the first batch will do the first and second ironing of the second batch. Proceed thus until all are ironed and appear (when held between the eye and the light) free from any opaque or shining spots, and perfectly clear and transparent.

Another method of waxing papers is to place the paper on two or three folds of blotting paper; then as you pass the iron over the back of the paper with one hand, follow it closely with a piece of wax held in the other—the excess of wax being ironed out as before. I do not recommend this mode of waxing papers previous to iodising, but it answers very well when one or two negatives have to be waxed, and must do when the photographer is unprovided with a tray.

After the negative is waxed, the edges should be trimmed; it is then ready to print from. In taking out the superfluous wax from the finished negative, as hot an iron as possible should be used to remove the wax, for notwithstanding all the photographer's efforts to extract the excess, he will not unfrequently find, by the spots in his print, that the sun has done what he was unable to effect; for the glass plate of

* Continued from vol. iii. p. 5.

† Technically known as the sky line.

* English photographers lay great stress upon the iron not being used too hot—a very hot iron spoiling the paper.

the printing frame becomes so hot as to transfer the wax from the negative to the positive, through the coagulated albumen.

Having said all that appears to be necessary on the subject of unwaxed paper, I will add what may be necessary to enable the novice to use waxed paper. He will find at the outset that it is much more difficult to immerse waxed papers in the iodising solution. The difficulty is lessened when there is a good depth of solution. I have also found that the papers are more easily immersed in a solution made with whey, than in one prepared with water. In exciting waxed papers, float twice the time directed for unwaxed papers. They will require about five-thirds the exposure, and generally the development, fixing, and washing of waxed papers will require a longer time. With these exceptions, the manipulation is the same as with plain papers.

In conclusion, I have only to add, that the method of manipulating is that followed by Captain Tripe and Dr. Neill, which will recommend it more to your notice than anything I can say in its favour. They do not soak their papers so long in the iodising solution as I recommend. It was an experiment with me, and the result having proved satisfactory, I of course direct you to do that which has succeeded in my hands. But I am not certain that such lengthened immersions are necessary, though I am quite satisfied they are not injurious. The iodising compound contains nothing new to photography, but the proportions are different from any published formula, I believe. How much of its greater rapidity of action is due to that (or, perhaps, the longer immersion in the iodising bath), I am not prepared to say, because neither my leisure nor circumstances permit me to enter into numerous experiments. But I know it is considerably quicker than any modification of the waxed paper process that I have tried; it is as quick as the calotype, and I think is deserving of a more extended trial by Indian photographers, than an individual has the power to give it. It is doubtless capable of improvement, and the probability of this will increase with the number of hands that can be induced to give it a trial.

THE DIFFERENT OPINIONS WHICH HAVE BEEN EXPRESSED ON THE SUBJECT OF M. NIEPCE'S EXPERIMENTS.

BY M. ERNEST LACAN.

Different opinions have been expressed on the subject of M. Niepce's experiments. Though the actions of light are often complex and vary under different conditions, they have a principle still unknown, for it would be easy to refute all the explanations hitherto given. The effects pointed out by M. Niepce have been variously attributed to—

1. The action of heat.
2. Ozone.
3. Electricity.
4. The formation of formic acid.
5. The formation of glucose.
6. The green salt of uranium.

Such are the various explanations which have been given by different authorities of the phenomena pointed out by M. Niepce. Without intending to discuss these different opinions, we would merely ask how they explain the following experiments:—

1. A black and white feather having been insolated and afterwards applied on sensitised paper, the white parts alone imprinted themselves on the paper; the same with respect to black and white chalk and black and white marble.

2. A piece of pipe clay or unbaked porcelain having been broken in half, and one part insolated and the other not, and the two pieces being applied to the surface of a sheet of sensitised paper, that piece which had been insolated blackened the paper beneath it, while the piece which had not been insolated made no impression whatever.

3. Several of M. Niepce's experiments have been repeated in pure hydrogen and in the luminous vacuum, and the same result obtained as in free air.

It is very evident to us that the true explanation of these phenomena of the sun's action remains to be given; and if M. Niepce used the perhaps somewhat inexpressive term, storing up of *light*, which to his own mind was only a figurative expression, no objection can be made to his use of the term *storing up of persistent activity acquired* under the influence of light. This activity liberates itself in the form of a gas, as M. Niepce has long known; but what is this gas, if it is a gas?

In a visit we made to this gentleman's laboratory, we witnessed a new experiment, which was as follows:—He impregnated two pieces of cardboard with a solution of nitrate of uranium; one of these pieces having been insolated, and both put into tubes of tinned iron, he filled these tubes with a solution of starch. Forty-eight hours afterwards he tried the two solutions with the copper test for sugar: that which had been in contact with the insolated cardboard gave a slight reduction of copper, while that which had been in contact with the non-insolated cardboard yielded nothing whatever, and did not even change colour.

A still more conclusive experiment consists in closing the starch in a small bladder, similar to those used for holding sausage meat, and suspending it in a tube containing a piece of insolated cardboard. The result is the same.

These experiments thoroughly prove that when we envelop a grape in a sheet of paper impregnated with nitrate of uranium, or nitrate of iron, or tartaric acid, the fruit ought to ripen more promptly and contain a greater quantity of saccharine matter, as M. Niepce has observed in one of his papers.

We may likewise observe that M. Niepce requested us to taste some wine which had been insolated in a white glass bottle hermetically closed, and we found a very great difference of taste between it and some of the same wine which had been exposed to the sun in a metal vase. We may say at once that there had been no acid fermentation in the wine which had been insolated in the stoppered bottle. Might it not be possible to obtain the effect of age in wine by this means?

It is probable that if the wine were in a blue or violet stoppered bottle the action of the light would be more prompt. For the rest, the colour of red wines is already very favourable.

We also saw in M. Niepce's laboratory an apparatus which is perhaps destined to render important services, and which is certainly very curious in a scientific point of view. This is a *solar pile*. This pile is of the most simple description. It is composed of a sheet of copper and one of zinc, separated by a round of cork, and furnished at their superior extremities with two brass wires, which unite. They dip in a solution of nitrate of uranium and oxalic acid. Under the influence of the solar rays the liquid becomes disturbed and enters, so to speak, in ebullition, in consequence of the liberation of a gas. The zinc is sensibly attacked, and a precipitate is formed which M. Niepce believes to be oxalate of zinc. It remains to test the power of this pile, which would be by far the most economical of any known.

LESS THAN A SECOND'S EXPOSURE!

"Why, it must have been *instantaneous!*" would be the almost universal comment upon the above statement.

There is, perhaps, no word used in photography by which a more erroneous meaning is conveyed than this word *instantaneous*. Popularly speaking, an exposure of less than one second is called instantaneous, but nothing could be more false in reality than such a term. What would be thought of the fitness of a term which classed together as similar in duration a second, a minute, an hour, a day, and a week? and yet this is what is commonly done by persons in their use of the word instantaneous.

We have heard it affirmed, that a fly is a medium sized object amongst living beings—meaning, that there are objects as much smaller than a fly as an elephant or a whale is larger, and this we believe to be true; but what shall we say to a *second* in respect to photographic time of action? Taking six hours as the maximum time of exposure, we can show differences in times of exposure, and variations in actinic action, on the *other* side of a second of time, far exceeding anything ever dreamed of in the ordinary practice of photography. In taking photographs of rapidly-moving objects—the waves of the sea, for instance—we have been obliged to judge of the proper exposure requisite to bring out the half tints, and estimate differences of time, varying between the $\frac{1}{50}$th and the $\frac{1}{120}$th of a second! And just as in landscape photography it is found that *one* minute's exposure produces hard, black and white pictures, with no gradation of tints, that three minutes would equally err in the opposite direction, giving a burnt-up sky and no contrast of tints, whilst two minutes' exposure give a correct representation of the object—so we have found that, whilst the $\frac{1}{120}$th of a second was too short a time, and the $\frac{1}{50}$th of a second too long a time, an exposure of $\frac{1}{100}$th of a second produced a good and correct representation of the object to be depicted.

Exposures like these are, however, enormous, when compared with the time occupied in other photographic experiments. Thus, in solar photography, according to experiments of Mr. Waterhouse, an image was impressed in a space of time no longer than $\frac{1}{9000}$th part of a second, even when a slow photographic process was used; and, when wet collodion was employed, one-third of the above time, or $\frac{1}{27000}$th of a second, was all that was needed. This duration, however inconceivably short as it appears, will be seen to be of a tolerable length, when we try to bring the mind to appreciate the rapidity with which Mr. Talbot performed his crucial experiment at the Royal Institution, where he photographed a rapidly-revolving wheel, illuminated by one single discharge of an electric battery. To a casual observer or reader of this experiment, the wonderful part appears to be that the wheel appeared perfectly sharp and *stationary* in the photograph, although, in reality, it was being rotated with as great a velocity as multiplying wheels could communicate to it. A little further consideration will, however, show, that the time occupied in a revolution of the wheel was as a planetary cycle when compared with the time of duration of the illuminating spark, which, according to the most beautiful and trustworthy experiments of Professor Wheatstone, only occupied the *millionth part of a second* in its duration.

What shall we now say to an *instantaneous* exposure of one second, when $\frac{1}{1000000}$th part of that time is capable of strongly impressing a collodion plate (as we ourselves have witnessed)? After applying such a *microscope to time*, as the above-mentioned experiments enable us to do, we must no longer consider one second as a short space of time in photography, as it vastly exceeds the medium between the longest time (six hours) and the shortest ($\frac{1}{1000000}$th of a second), which we have been considering; and, as regards the word "instantaneous," we strongly suspect it will have to be banished altogether from the photographers' vocabulary, for we shall doubtless become acquainted, as we obtain further insight into the mutual relations of photography, electricity, and physical optics, with spaces of time, compared with which the millionth part of a second will be of a long duration.

The British Association.—Owing to the comparatively few matters of interest to our readers that occupied the attention of this meeting up to the time of our report being transmitted from Aberdeen, we prefer delaying until next week the notices of the photographic, chemical, and other papers, which are likely to prove of interest to our readers. By that time we shall be in possession of full and trustworthy reports of everything of interest.

Dictionary of Photography.

Formic Acid.—The name of formic acid has been given to this body, because formerly it was prepared by distilling red ants with water; now, however, it is prepared more simply by the oxydation of a great number of organic bodies, such as sugar, starch, gum &c., which are acted upon by means of a mixture of sulphuric acid and peroxide of manganese. A better plan than the above has recently been published by M. Berthelot, which consists in causing glycerine to react on oxalic acid: this yields considerable quantities of formic acid. This acid in its concentrated state is liquid and very corrosive—a drop of it allowed to fall upon the skin very quickly raising a blister. Its odour recalls that of red ants. It is an energetic reducing agent, and from experiments of Mr. Lyte and others it seems likely to be of great value in photography. Formic acid unites with bases and gives rise to salts which are called formiates.

Fraunhofer's Lines, in the solar spectrum.—A full explanation of the causes and origin of these lines having recently been given in the "Photographic News," we will not enter again into their discussion in this place; but as we have found, on conversing with even well-informed scientific men, that there are many facts connected with these phenomena that have been from time to time placed on record, but concerning which great ignorance prevails, we think it would be advisable to collect together under this head some of the most important and interesting results which have been hitherto obtained. We are the more induced to adopt this course, as the results of these investigations being frequently contained in rare or expensive volumes, are most likely to escape the notice of the bulk of those who would feel an interest in them.

The following abstract of the original paper by Fraunhofer, "On the determination of the refracting and dispersive power of different kinds of glass" cannot fail to interest our readers:—The light from the sun was allowed to pass through an aperture between two knife edges, having a diameter of about 15 seconds and a height of 36 minutes. The prism was of flint glass, having an angle of about 60°. It was placed at it, angle of minimum deviation and at a distance of 24 feet from the aperture; close behind it was placed a theodolites in which the spectrum was viewed.

The principal lines in the solar spectrum do not occupy a space of more than from 5 to 10 seconds.

When the light from a lamp is made to enter through the same opening as the sun's light, the only ray which is seen in it is the one which is distinguished for its brilliancy. It is exactly in the same place as the line D in the solar spectrum, so that the refrangibilities of the two rays are equal.

If sunlight is passed through a small circular opening of about 15 seconds diameter, and then allowed to fall on a prism placed in front of a theodolite, it is evident that the spectrum seen in the instrument will only be very small in width, and consequently will form only a line. However, in a line which has hardly any width it is impossible to see any fine and delicate lines that cross it. In order to see all the lines, there must be placed in front of the object glass a plain cylindrical lens of a long focus. The axis of the cylinder being parallel to the base of the prism, the spectrum will not be increased in length, but will be in width and in it will be seen the usual lines.

This apparatus was employed at night to examine the fixed lines in the light coming from the planets and stars. The planet Venus contains the same rays as sunlight. Sirius contains three distinct rays which are not seen in the solar spectrum, one of them in the green and two in the blue. The other stars of the first magnitude give lines, but apparently differing from one another; but the object glass having only 13 lines aperture, the light from them was too faint to be accurately examined. In the spectrum of the electric light there is a ray of the same refrangibility as the bright line in artificial light.

By examining carefully, and with a prism of great dispersive power, the yellow line of artificial light, it is seen to be composed of two very fine bright lines, alike in size and in distance apart from each other to the two black lines D. Whether the slit be large or small, if the tip of the flame and also the base be covered up, the yellow line becomes less visible and more difficult to distinguish. It follows, therefore, that this line has its origin in the two extremities of the flame, and principally in the lower part. This line is very distinct in the spectra of the flames of hydrogen and of alcohol. In the flame of sulphur it is very difficult to distinguish.

Photography Practically Treated.

BY ALEXANDER WATT.

INTRODUCTION.

Of all the chemical arts which have engrossed the attention of man during the present century, none has received so much consideration and support as photography. Even the beautiful art of electro-metallurgy, which, a few years since, was in the hands of everyone who could find leisure and means to furnish himself with a battery and a solution of sulphate of copper, did not meet with such universal attention as the art of taking pictures by light.

And this need not be wondered at when we consider that, by pursuing this delightful art, the amateur could obtain, as a reward for his labour, faithful representations of those most dear to him on earth, as well as those scenes for which, from some pleasing association or other, he entertained the fondest regard.

By this time, probably, every part of the civilised world is cognisant of the advantages of photography in pourtraying, with minutest accuracy, the "human face divine," and those scenes

"O'er which the fond heart loves to dwell."

And how many rejoicing eyes have beheld, with infinite rapture, in a distant clime, the portrait, transmitted to them by post, of some beloved relative whom they had not looked upon for years!

The photographic art, also, being a thing unpatented, unsecured, has soon been turned to good account by the governments of various nations, who are now applying it in many ways most extensively. Whilst, as a source of profit, it has given employment to thousands; as an instructive and intellectual amusement the art has afforded delight to millions of beings in every part of the great globe.

It is no wonder, then, that in such an art there are many who, having a thorough acquaintance with its practical details—which are as variable as the tints of the chameleon—should be desirous of communicating their thoughts and methods of manipulation to those who are probably not so well informed. Indeed, much has been written on this subject by persons well able to do so; and, by studying these works, doubtless, many a person, having a taste for experimental science, has eventually become an experienced photographer—the desk or counter being abandoned for the more exalted and mysterious operations of the photographic chamber of darkness!

So much having been written upon photography, it was not without a great deal of reflection and anxiety that I ventured to offer my services to those who may yet be in need of a little further aid to render them competent to work with success.

Mr. Hardwich, in his excellent "Manual," has so admirably and so fully entered into the theory and general chemistry of the science of photography, that I feel in this respect he has left but little for others to do. My object in the present undertaking, therefore, is to give the reader simply a practical view of the subject, without entering, more than is necessary, upon theoretical considerations.

In an experimental art like photography, I conceive that no two men work alike to obtain the same results, for there are so many circumstances constantly occurring which render necessary a slight deviation from published rules; and, in order that the operator may be able to depart from these rules with advantage to himself, he should, properly speaking, be acquainted with the *chemistry* or general science of photography, before practising it as an *art*. Presuming, however, that many have not the opportunity or time to acquire the amount of chemical knowledge which would enable them to modify, according to their own judgment, the *proportions* of substances employed to suit any particular exigence, or to make certain alterations which a chemist only could venture to do, I purpose entering into the subject only in a practical way, acquainting the reader with those methods which I have found best to succeed. In doing this, I will take care to avoid as much as possible all technical expressions which may be likely to confuse the beginner.

Presuming that the reader is at present unacquainted with photographic manipulation, I will endeavour to impress upon his mind, in as simple a way as possible, the practical details of the various processes which are most likely to succeed with a beginner, reserving the more complex matters for a period when his knowledge and practice will be more advanced. Thus, by creeping on gradually, in a short time the student may find himself well able to undertake the more difficult operations. I will, therefore, begin with the collodion process as now practised by experienced photographers, and giving only those formulæ which I have found to answer well.

THE COLLODION PROCESS—GLASS POSITIVES.

The student, previous to commencing the manipulatory details of the art, will have to provide himself with all the necessary implements and chemical substances requisite to take a picture. These should be procured at a respectable house, as much depends not only on the accuracy of the camera but the purity of the chemical matters employed. Sometimes the chemical and visual foci do not correspond in a camera; that is to say, when a certain object has been *focussed*, the picture which has been taken is not *sharp*, that is, the details appear as if enveloped in a mist. It will, therefore, be necessary for the beginner to have a warranty, when he purchases a camera, that it shall in all respects work well. I mention this, as much disappointment and loss have occurred to the operator through the carelessness of the camera maker.

The following will be found necessary to enable the student to take his first picture. I will suppose that he purchases a small instrument to begin with—that which is commonly called a quarter-plate camera. And, for the sake of economy, I would further recommend the amateur to operate in the small way at starting. Procure:—

One dozen sixth-size glasses with ground edges.
An 8-ounce glass bath well coated with black varnish.
A sloping stand for ditto.
A glass funnel.
A few sheets of filtering paper.
A drachm measure.
A one-ounce ditto.
Box of scales with glass pans.
Set of grain and drachm weights.
Two flat porcelain dishes, 6 × 4, or thereabouts.
Chamois leather.
Several clean rags.
Glass or porcelain dipper.
One ounce of cyanide of potassium.
One ounce of glacial acetic acid.
One ounce of sulphate of iron.
One ounce of alcohol.
One ounce of nitrate of silver.
One ounce of bichloride of mercury.
One ounce of nitric acid.
One ounce of crystal varnish.
One ounce of carbonate of soda.
One quart of distilled water.
One glass rod.

Having obtained the above, they should be carefully arranged in the operating room, so that no confusion may arise in their employment. The chemical substances should be kept in bottles and all labelled, the greatest care being taken that each bottle be returned to its proper place after using, as many serious mistakes have arisen from beginners not having exhibited sufficient caution in this respect.

The operator must be provided with several cloths and a chamois leather, which have been soaked in warm water containing a little soda, and afterwards well rinsed in perfectly clean water, which should be changed half-a-dozen times.

The glasses should now be cleaned as follows:—Put about one half of the nitric acid in a clean two ounce bottle, and fill up with cold water. Pour a little of the dilute acid upon

glass plate, and gently rub it all over both sides of the plate either with the fingers or with a piece of rag; it will not do the fingers any injury, if they are rinsed occasionally in water, unless there be an abrasion of the skin. Each plate is to be treated in the same way, and then they are to be well rinsed, one by one, under a tap, if convenient. Each one is then to be wiped upon one of the cloths and finished upon another, when it may be put aside until all are done. The fingers must not be allowed to touch either side of the plate, which should always be held by the edges only.

When all the glasses are clean, they should next be well rubbed with the leather, and, by breathing gently on the glass, the operator will soon discover which is the best side of the glass, and whether it is quite clean. If there are any transparent streaks or curved markings on the glass, distinguishable when breathed upon, it should be rubbed again. The glasses, when they have received the final rubbing, should be put in a box kept for the purpose, always putting the best side of the glass one way—say to the left hand. My reason for urging this is, that sometimes one side of a glass is more highly polished than the other, consequently, it will be the best side to take the picture upon. Before using the cloths and leather, the hands should be well rinsed and dried, in order that the cloths may be kept quite clean, which is of far greater importance than many would imagine.

The Bath may next be prepared, and, as success will depend principally upon this part of the operation, the greatest care will be necessary, not only in making it, but in keeping it from injury when made. Although the utmost care is necessary, the operation is a simple one.

Dissolve four drachms of the best crystallised nitrate of silver in about half an ounce of distilled water, which may be done in the ounce glass measure; stir occasionally with the glass rod, to hasten the operation. Now dissolve *one grain and a half* of the iodide of potassium in half a drachm of distilled water, in the drachm measure. This will dissolve immediately. Pour the whole of this into the strong solution of nitrate of silver, stirring all the time. A yellow precipitate will be formed at first (the yellow iodide of silver) which will become at once dissolved by the nitrate. Next dissolve in the drachm measure a few grains of the carbonate of soda in half a drachm of water; add a few drops of this—say about ten—to the solution of nitrate of silver, which will render it somewhat turbid. Now pour the solution of nitrate of silver into a bottle capable of holding about ten ounces, and add seven ounces and a half of distilled water. This will cause a milkiness, owing to the water having precipitated a portion of the iodide of silver. The solution must now be filtered, which may be done as follows:—Fold a square piece of filtering paper so as to form a triangle; fold this again in the same way; then open it, and place in the funnel, which must be quite clean. Pour in a little of the nitrate solution, and allow this to run into the bottle in which the bulk of the solution is, as, in the first filtering, the solution may not run through quite clear; in fact, this may be done several times. The funnel may now be placed in a perfectly clean bottle, which has been rinsed with distilled water, and the whole of the nitrate solution filtered into it. When this is done, remove the filter, and add to the solution two or three drops of glacial acetic acid. Shake the bottle for a few seconds, and the sensitising solution, as it is termed, is fit for immediate use.

The glass bath and dipper must now be well washed, and lastly rinsed with distilled water, in order that no impurities may be communicated to the solution, which is now to be poured into the bath. It will be advisable to make a cover for the bath, which can be readily done with a piece of pasteboard or stiff brown paper, in order to prevent dust and other matters falling into the bath, and further, to prevent light attacking the top of the plate when in the bath.

The bath should now be placed in such a position that the plate may be immersed in the sensitising solution with ease, and it should not be placed too close to the yellow glass or calico through which the light enters the dark room.

The sensitising solution and glasses being ready for use, we must now turn attention to rendering the apartment in which the operations are to be carried on what may be termed *chemically dark*, that is to say, the light which enters the room must be of such a *colour* that it will not act *chemically* upon the salts of silver with which the picture is to taken.

This may be done in several ways. The light may be entirely excluded, by fastening a double fold of black calico over the window, stopping out every ray of light, and by operating with a single candle, the light of which must not be allowed to fall direct upon the sensitised plate, or it will produce what is termed "fogging." The light of the candle should be allowed to pass through a piece of yellow glass, which may be placed immediately before it in any convenient way.

Or a single pane of the glass window may be covered with several folds of yellow calico, the other parts of the window being covered with the black calico. But the best plan is to procure a sheet of dark orange-coloured glass from a photographic glass warehouse, of the exact size of one of the squares of glass belonging to the window. This may be easily fastened against the white pane with a little putty, all the other parts of the window being carefully covered either with black calico or brown paper. Every aperture of the door should be closed, either by pasting brown paper over it, or by some other means, as the smallest amount of light entering the "dark room" may do mischief. If the operator shuts himself in this room without a light, having previously covered over the yellow glass, he will soon see if any light creeps in anywhere.

In cases where it is impossible for the operator to have a sink and pipe proceeding from a water tank, the following plan will be found simple and economical:—Place a small stool or box turned upside down on the table or operating board. Have a hole drilled immediately above the bottom hoop of an ordinary bucket, into which insert a small brass tap. The bucket may be kept full of water to prevent leakage, and it should be placed on the box or stool aforesaid. A broad earthenware pan should be placed under the tap, which will form a convenient arrangement for developing and washing the plates.

The next thing to do will be to mix the materials forming the developing agent, and as the "developer" used for positives will keep some time without undergoing decomposition, it will be well to have a good quantity of it ready for use.

POSITIVE DEVELOPER.

Weigh out sulphate of iron	160 grains.
Water	16 ounces.

Dissolve, constantly shaking the bottle; then add—

Alcohol	6 fluid drachms.
Nitric acid	4 drops.

These must all be intimately mixed together, and the developing solution is ready for use. Label the bottle—"Positive developer."

For fixing the image, dissolve—

Cyanide of potassium	40 grains.
In water	4 ounces.

Label the bottle—"Fixing solution."

This may be kept in a wide-mouthed bottle, as, in the process of "fixing," the solution may be used over and over again, by returning the solution to the bottle after it has done its work on the plate. But of this hereafter.

I should recommend the student, before proceeding to make up these various solutions, to write down in his note book the names of the substances employed and the proper proportions, so that no mistakes may occur, and that he may feel sure that he has provided himself with everything requisite to take a picture, otherwise he may, should he have omitted even a single item, be frustrated in his first attempt, which is, as we all well know, a great disappointment.

Next week we will proceed to show how the materials referred to are to be employed, and we trust that our pupil will be able to succeed in taking his first picture successfully, which, with care, he may readily do.

(To be continued.)

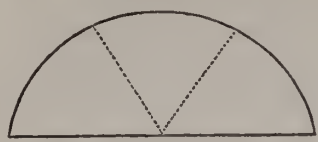
The Amateur Mechanic.

GUTTA PERCHA—*(continued).*

It would be a task, as difficult and protracted as it would be unnecessary, to attempt to enumerate all the purposes to which gutta percha may be applied in the construction of photographic apparatus, as the exigencies of the experimentalist will constantly suggest fresh applications of a material so easily

worked. Many of the articles for the formation of which it is most suitable, will, as we have before remarked, be easier to procure ready made than to manufacture at home; but this does not lessen the advantage of being able to improvise an important article on the spot in an emergency.

A funnel for instance: to make this it is only necessary to take a piece of sheet gutta percha, of a semicircular shape, and slightly softening in hot water, bend it into the form of a cone, the centre of the horizontal line forming the apex, thus:—



The edges must then be cemented, as we have described for other articles. If a piece of gutta percha tubing of suitable thickness be at hand, it will easily be joined so as to form the stem of the funnel. If the tubing be not readily procurable, there will be no difficulty in making sufficient for the purpose. An impromptu funnel may thus be produced in a few minutes.

A developing stand is also very simply made. A piece of gutta percha of any shape is required for the top. A triangular form will be most easily supported. To each corner supports are to be cemented, consisting of strips of gutta percha, say four inches long and half-an-inch broad. The best way to do this is as follows:—Pare one end of each support to a thin edge; then, about half-an-inch from such edge, make a slight incision across the strip, so as to allow it to be bent over, the pared edge forming a right angle with the remainder of the strip. By the aid of the flame of a spirit lamp the pared edge will be easily cemented to the top. If, instead of a simple incision where the strip is bent over at the joint, a small groove be made, so as to give the support a slight hinge-like movement at that point, it will afford facilities for adjusting the level of the stand, by moving any of the legs more or less out of the upright, on the principle of Mr. Sang's wire levelling stand.

An excellent suggestion for a simple and easily contrived levelling stand, which may be formed of gutta percha, was made by an anonymous correspondent in one of the journals some years ago. We give it in the writer's own words:—"Procure a three-legged stool, about seven or eight inches high, and with a perfectly flat top; take one of the largest sized gutta percha funnels, and measure the diameter of its circle at about three-quarters of an inch below the rim; cut an accurately circular opening of this diameter in the top of the stool; drop the funnel into this opening, and you have your levelling stand. The weight of the plate to be developed placed on the funnel keeps the latter sufficiently steady; or when very small plates are used, this object may be attained by dropping a small lead or other weight into the funnel, or by interposing between the latter and the plate to be developed a small square of thick plate glass.

"Its advantages over the ordinary tripod stand are, that with the usual plate glass and spirit level, the exact level is more quickly and easily found; the operator, with his hand under the stool, lightly holding the neck of the funnel between the finger and thumb, being enabled to direct and control the inclination of the surface with great ease and nicety, while the precision with which motion can in this way be communicated to the fluid on the plate, without spilling, is of great service in the development, particularly when this is long in completing; moreover, the difficult feat of pouring the fluid off a large plate into a receiver without spilling, is readily managed with this apparatus, without removing the plate from the stand."

To this description of a levelling stand, which we have tried and found perfectly successful, we will only add one or two suggestions. For the "three-legged stool" may be substituted a stand of gutta percha, such as we have described above; or, what answers the purpose exceedingly well, a wide-mouthed bottle, like an ordinary pickle jar. For the funnel, the amateur who manufactures his own apparatus, may substitute the hollow cone of gutta percha, made by bending to the proper shape a semicircular piece of sheet gutta percha, as described in a preceding paragraph; the addition of a stem or neck, as in a funnel, being unnecessary for this purpose. The insertion of such a cone into the opening of a wide-mouthed bottle forms the simplest and most efficient levelling stand we have used. It admits of the most accurate adjustment without any trouble, and there is no danger of it getting out of order.

(*To be continued.*)

Photographic Chemistry.

CHEMICAL NOMENCLATURE—(*continued.*)

Before stating the rules which govern the nomenclature of compound bodies, it is advisable to define certain general terms which are applied to them. Among compound bodies are specified *acids, bases,* and *salts*. Salts result from the combination of acids with bases. If a salt be submitted to the action of a voltaic pile, the elements of which the combination is formed separate; if the pile be very powerful the compound is entirely destroyed and is resolved into its simple elements; if it be weak, the acid merely separates from its base, the former flying to the *positive pole* of the pile, and the base to the *negative pole*. Electricities of the same name repel each other; those of a contrary name attract each other. It has been supposed that the molecules of bodies are either electric in themselves or are surrounded by electrical atmospheres. If this hypothesis be accepted it is clear that the molecule which flies to the positive pole ought to possess *negative electricity*, while that which flies to the negative pole ought to possess *positive electricity*. It is admitted, therefore, that at the instant a salt decomposes under voltaic influence, the acid molecule acquires negative electricity, and the basic molecule positive electricity; hence the acid is termed the *electro-negative element*, and the base the *electro-positive element* of the salt. Therefore the manner in which a salt decomposes under the influence of the pile suffices to distinguish the acid element and the basic element. The acid element, or electro-negative, is that which flies to the positive pole; the basic element, or electro-positive, is that which attaches itself to the negative pole of the battery.

When both the acid and the basic elements are soluble in water they exhibit properties which enable them to be distinguished from each other with the greatest facility. A number of organic colouring matters are changed in a different manner by acids and by bases. Tincture of litmus as found in commerce is of a violet blue colour. If an acid be poured on this tincture, the blue colour is changed into a clear red. *Therefore acids redden the blue tincture of litmus.*

If we take the same tincture and pour into it the solution of a base, the blue colour is not altered; but if the tincture has been previously reddened by the addition of an acid, the blue colour will be restored. *Therefore soluble bases restore the blue colour of the tincture of litmus when it has been reddened by an acid*

The yellow tincture of turmeric *is not altered* by acid solutions, but *it is reddened* by basic solutions.

The violet-coloured tincture of violets is *reddened* by acids, and a *green* tint is communicated to it by bases.

It is evident that these characters are only available in the case of acids and soluble bases. When these bodies are insoluble, they can only be distinguished by the manner in which they behave under the influence of the galvanic pile, or by the manner in which they combine with acid or basic bodies, of the nature of which there can be no sort of doubt. Many soluble bodies exercise no influence whatever on the colour of the reagents; they do not redden the blue tincture of litmus, nor, if this tincture be reddened, do they restore it to its original colour. These are termed *indifferent*, or *neutral*, bodies. A great number of salts exhibit this property; in these salts the reaction of the component acid and base on vegetable colouring matters are perfectly neutralised; hence they are termed *neutral salts to coloured reagents.* This state of neutrality, however, depends on the relative strengths of the acids and the bases. A powerful base can seldom be completely neutralised by one equivalent of a feeble acid in respect of its action on a coloured reagent, nor, on the other hand, can a feeble base always destroy the influence exercised by an energetic acid on these reagents. It will be readily conceived that a salt which acts as a neutral body

with a certain coloured reagent, may present an acid or basic reaction with a more sensitive reagent. Bodies likewise exist which play the part of acids in relation to very strong bases, and bases in relation to energetic acids; hence the distinction between bases and acids is far from being absolute, since the same body may, under different circumstances, appear either the one or the other.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 12*th September*, 1859.

MM. Nièpce de St. Victor and Lucien Corvisart have presented to the Academy of Sciences, at Paris, a memoir to this effect:—"*Decomposing influence exercised by light on vegetable and animal fecula, on dextrine, cane-sugar, and oxalic acid, and on some substances which annihilate or increase this solar action.*"

In one of my previous letters, I have already given you an idea of this coming work, of which a *resumé* has lately appeared in most of the photographic journals here. The fact that I stated some time ago, of starch being converted finally into sugar, by the sole influence of light, appears to have been completely confirmed since I wrote to you concerning this remarkable transformation. Thus, MM. Nièpce and Corvisart state that, "The sole but prolonged action of light transforms pure dissolved fecula into dextrine and sugar." But, first of all, solar light appears to modify the nature of fecula without transforming it either into dextrine or sugar. According to the authors quoted, a new substance, which neither becomes blue with iodine (as starch) nor acts upon the plane of polarisation (as dextrine or sugar), is formed in these circumstances. They think the starch becomes similar to *inuline*, but not identical to the latter, as the new substance does not reduce salts of silver and copper in presence of ammonia. Six hours of insolation, acting upon a very weak solution of starch, is necessary to operate this change of properties. Certain substances, such as lactate or citrate of iron, bichloride of mercury, &c., prevent this phenomenon; whilst tartrate of iron and potash, and especially nitrate of uranium, increase the solar action.

Dextrine, prepared artificially, and cane-sugar, are not influenced by light.

But the prettiest experiment by far, contained in this new memoir, is the following:—

It is well known that concentrated sulphuric acid, heated to a certain degree, is necessary to decompose oxalic acid. A solution of this acid (oxalic) heated for many hours to 40° (centigrade) in the dark, with a weak solution of nitrate of uranium, is not decomposed; but if the latter mixture be exposed to the sunlight, is rapidly decomposed, and, in about an hour's time, a certain quantity of inflammable oxide of carbon is produced. This action may be measured by means of an apparatus consisting of a glass bottle, through the cork of which plunges a glass tube; the bottom of the bottle is covered with crystals of oxalic acid, on which a solution of nitrate of uranium is poured, so as to leave a little air in the bottle. The oxide of carbon, which is formed when this little apparatus is exposed to the sun, presses upon the liquid, and forces it to mount in the tube. The latter may be graduated to show the quantity of action obtained in a given time.

By "animal fecula," the authors understand the peculiar glycogenous matter extracted from the liver by M. Claude Bernard, and which appears to be easily transformed into sugar. This substance is yet little known. MM. Nièpce and Corvisart assert, that it is transformed into sugar more rapidly in light than in darkness, but that nitrate of uranium has no action whatever upon this transformation.

According to some late researches of Professor Schiff, no sugar is formed in the bodies of animals (frogs) when they are kept in the dark. We may add to this, that the abundant quantity of glycogenous matter found in the tissues of the fœtus, disappears as soon as the child is born and placed in the light, to give place to sugar.

In a letter to M. Ch. Chevallier, M. Alphonse de Brebisson describes the manner in which he operates to obtain carbon proofs, as follows:—

"I dissolve 6 or 7 parts of fine gelatine in 100 parts of water, saturated with bichromate of potash, in a porcelain capsule, over a spirit lamp. On this solution I float a sheet of stout satin paper, which I remove in a few seconds, and hang up by a corner to dry.

"When it is dry, I place it in a *cliché* behind a proof. An insolation four times less than that which is required for paper prepared with chloride of silver, is all that is necessary. The effect is quite as good if the exposition takes place in a diffuse light. If the white portions are at all solarised, the charcoal will not adhere to them.

"After exposition, I go into a dark room, and I place my proof, the image uppermost, on a sheet of glass, where it is fixed, *pro tempore*, by thick pieces of gum at the corners and sides. Then, with a cotton towel covered with carbon, I rub the proof gently so as to give it an uniform layer of black. The carbon I employ is the fine lamp-black, perfectly dry; it may, however, be replaced by plumbago, by red ochre, or any other similar substance, in form of a very fine powder, and perfectly dry.

"The proof is then removed from the glass, placed in a basin, and boiling water poured over it; by the aid of a sort of painting brush formed with fine soft rags, the drawing soon appears, the white portions are easily cleansed, and a good washing in much water terminates the operation."

M. de Brebisson goes on to remark that many operators put on the carbon before insolation, but his own experience teaches him that this mode of operating impedes the action of light.

M. Pelouze, who has just returned from Munich, informs us that he was present in Baron Liebig's laboratory during a very interesting experiment. In fact, M. Liebig has just discovered that by the action of nitric acid upon the different species of gum, sugar, lactine, &c., these substances can be converted into tartaric acid. It is the first time tartaric acid has been formed artificially in the laboratory, and the effect will be considerable, especially if, as it appears very probable, tartaric acid becomes extensively employed in photography. Considerable quantities are employed during summer on the Continent, to manufacture effervescing drinks, &c.

To assure himself that the tartaric acid thus produced was identical with that furnished by the grape, M. Liebig prepared with bitartrate of potash, tartrate of potash, and antimony, &c. In this action of nitric acid on the substances above-named, it appears that mucic acid is formed first, and afterwards tartaric acid is produced. This is certainly singular. Up to the present time mucic and oxalic acids were looked upon as the final products of the action of nitric acid on gum, &c. According to the account given by M. Pelouze of M. Liebig's experiment, the mucic acid formed in the first place, transforms itself by the prolonged action of NO_5 into saccharic acid (sometimes called oxalhydric acid), and then this is converted into tartaric acid. M. J. Maurice, of Tours, has discovered that by replacing the nitric acid in the Grove or Bunsen battery by oxalic acid the effects produced are both more rapid and energetic. M. A. Riche has obtained a peculiar carbide of hydrogen presenting the same composition as bi-carburetted hydrogen, by submitting a mixture of suberic acid and baryta to a temperature of 80° (centigrade). At this temperature a white smoke issues from the mixture and condenses itself in the recipient in the form of a colourless, or slightly yellow, liquid. When submitted to distillation it is found that its boiling point is 76° (centigrade). Its odour is slightly aromatic; it refracts light powerfully; is very inflammable, and becomes of a violet tint with sulphuric acid.

To preserve iron from oxydation, a Belgian manufacturer, residing at Auderghem, near Brussels, has invented a new colour which he calls *minium de fer*, and which is destined to replace litharge or lead paint. Its action is said to be so efficacious that several railroad companies have employed it. All I know of this new material for painting iron to preserve it from rust, is that it is prepared from the iron ore itself. In fact, instead of allowing the rust to come on of itself in course of time, and instead of employing oxide of lead to prevent this rust coming on, a layer of iron-ore paint, or rust in its natural form, is applied.

M. Corbelli writes to the *Moniteur des Interêts Materiels* that he has discovered a new method of obtaining aluminium from clay. The process he employs is as follows:—100 grammes of as pure clay as can be found is treated with six times its weight of concentrated sulphuric acid (any other acid may be employed). When the action of the acid has ceased, and the earthy matters are well deposited, the clear liquid is decanted off. This operation is made to effect the elimination of the iron contained in the clay. The residue is dried and heated to 450° or 500° (centigrade), it is then mixed with 200 grammes of yellow prussiate of iron, dry and pulverised; the quantity of prussiate must be augmented or diminished, according to the quantity of silica contained in the clay. To this mixture 150 grammes of common salt are added. The whole is placed in a crucible, and heated to a white heat. After cooling, metallic aluminium is found at the bottom of the crucible.

THE ISLE OF WIGHT FROM A PHOTOGRAPHIC POINT OF VIEW.

To the Editor of the "Photographic News."

Sir,—Of course, while I was staying at Freshwater Gate, I did not omit to make an excursion to Alum Bay, going along the cliffs as far as the lighthouse. My camera was left at home on this occasion, as I was anxious of seeing beforehand whether any satisfactory picture would be got in this direction. This walk was in itself worth a trip to the island. We continued ascending along a beautiful down, sprinkled with sheep, who, by their incessant cropping of the somewhat scanty herbage, gave rise to an aromatic smell which filled the air with its fragrance. Upwards, and always upwards, with the cries of the sea-fowl ringing in our ears, we continued our way until we reached the lighthouse on the top of the cliff above the Needles. From this point we had another of those views for which the Isle of Wight is famous. Inland the eye wandered over an immense tract of country, offering every variety of scenery; while over the sea it rested on innumerable sails of vessels of all sizes and every description, from the little yacht of three or four tons to the magnificent man-of-war forming one of the Channel Fleet. The cliffs along this part of the coast are the highest in the kingdom—at least, I was told so —and certainly they are the highest I ever saw, though whether they are really as much as 650 feet above the sea is a point on which I shall not venture an opinion. From here we returned to Freshwater Gate by sea, having hired a boat at Alum Bay to take us round, so that we might get a good view of the Needles; for although we could get a pretty fair view of them from the land, we decided that it was not so good as to make it worth while to bring the camera for the purpose of taking a negative of them from this point of view. To see them to advantage they must be seen from the sea, and to photograph them from this direction would require Mr. Skaife's gun camera, and a subsequent enlargement of the negative by means of Mr. Woodward's solar camera—which, by the way, must give a better picture than the only one I have seen printed by it, or I should not attach much value to its possession.

The sail from Alum Bay to Freshwater Gate is a most delightful one, the views which are obtained being of a very remarkable character. A photograph in natural colours of a portion of the cliffs of this bay would present a very singular appearance. It so happened that a drizzling rain set in as we were sailing by, so that we did not see it to advantage; but the boatman assured us that they were tinted with various colours arranged side by side, such as a deep red, blue, bright yellow, grey and black, following each other, and offering the strongest contrast. The adjoining bay, called Scratchell's Bay, offers the best position from which to take a photograph of the Needles. There is a great arch, from the bottom of which a very good view could be obtained; but there would be some difficulty in running a boat in with the camera if there were a sea running, and as this is a very common circumstance, I did not think it would be worth while to sail such a distance, at the risk of getting my apparatus wetted, without being able, after all, to attain my object.

On leaving Freshwater Gate we drove over to Yarmouth, not in itself a place of any great interest, nor offering any object which I thought worth taking; so that I spent a few hours in preparing some plates, six of which I coated with mucilage, according to the formula given by Mr. Keene in a number of the "Photographic News," just by way of experiment. The first of these plates I exposed before a large mansion near Cowes, with fine trees behind it and on each side. The day was very hot, and the objects were strongly illuminated, so that I considered two minutes' exposure would be ample, even for the foliage. I developed the plate the same evening with the solution prescribed, but the result was not very satisfactory; there was a deficiency of depth, and the outlines were badly defined, and there was a want of vigour in the negative which induced me to think that the print from it would be of little value; consequently, I washed it off. The next plate prepared in this way which I exposed was somewhat better; but as it did not come up to the proper standard of excellence, I did not think it worth keeping, more especially as the subject was not one of any interest, being merely chosen close to the hotel with the view of testing the process. At the same time, the appearance of the plates was encouraging. There were no blisters, nor stains, nor any other defects of that kind; hence I conceive that the weakness of the negative may have been caused by too much of the nitrate of silver solution having been washed off, and I purpose to renew the experiment, as soon as I have leisure, with more care, as the advantage of employing a solution of gum as a substitute for albumen is very evident, the trouble of preparing it being as nothing in comparison. Moreover, I was particularly struck by the absence of blisters in all the plates, though they were prepared without any particular precautions, beyond filtering the solution through a bit of sponge placed in one of the little glass pourers which you designed for use in your modified albumen process. I shall be glad to see, through the medium of your journal, that some of your readers have given this process a trial, as I shall be unable myself to pursue any more experiments with it just at present.

To return to the more immediate object of this letter after such a long digression. The neighbourhood of Yarmouth not presenting any very attractive objects for my purpose, we drove over to Newport again, and from thence made excursions to several places we had not previously visited; amongst others, to Watergate, consisting of a few scattered houses near a pretty little brook. Several very interesting negatives were obtained of spots in the neighbourhood of Marwell Copse, chiefly landscapes, thickly dotted with trees. At no great distance from Marwell Copse we came upon Gatcombe. There are some beautiful views about here, making admirable pictures, either for the portfolio or the stereoscope. The church is small, and almost hidden by the foliage surrounding it, but it makes a very pretty picture, especially for the stereoscope, and so also does the Parsonage. The village itself is likewise very picturesquely situated, and yielded me three excellent negatives; so that, on the whole, I think I found this place about as fruitful in views as any place I visited in the island. For fine trees, especially, this part is well worth visiting, and many a group of three or

four makes a picture which one can hardly tire of looking at—at least, I find that to be the case as regards my own; but perhaps we are apt to regard our own work with something like parental affection. After leaving Gatcombe we went to Godshill—a straggling kind of place, built on the sides of the hill so called, on the top of which stands the church, a rather fine-looking building of old date. I was able to get three nice negatives here, in two of which the church forms a conspicuous and picturesque object. I should have liked to take some stereoscopic negatives of a series of monuments which this church contains, which are interesting as specimens of the art and costumes of the different periods in which they were sculptured; but the weather was too dull for working indoors when I was there, and I merely mention this for the benefit of those who may read this letter, in the event of their going to the island. As in many other parts of the country, the church is placed where a good proportion of the people would find it difficult to reach it—that is to say, on the top of the hill. The reason assigned for building the church here, is one with which we wandering photographers are familiar. It was begun in the valley; but all the building performed during the day was regularly undone by the spirit of evil during the night, and, after a fruitless contest, it was resolved to build it on the top of the hill: the real reason for building this and other churches on a hill being, I presume, to keep men's religious duties present in their memory, by the constant sight of the building consecrated to their performance, and also for certain allegorical reasons.

The next place we visited was the seat of the Earl of Yarborough—a very fine building, which has the appearance of having been built several generations since. It makes a good picture, and the park, through which anybody is permitted to drive, presents some very attractive features, and the views which claim the attention of the photographer are so numerous as to create an *embarras des richesses*. At the time we visited this place I was, unfortunately, ignorant of what I have since been informed is the case, viz., that visitors may obtain admission to view the principal rooms in the house, and, what is of far more interest, the museum it contains, which is said to be exceedingly rich in pictures, statues, gems, and various ancient things, collected principally by Sir Richard Worsley, the former possessor of the place, who purchased them at an enormous cost in Italy and Greece; and afterwards, with the assistance of a distinguished Italian, described them in a book which is said to have cost him not less than £27,000 by the time it was issued from the press.

[The remainder of our correspondent's letter will be given next week.—Ed.]

Photographic Notes and Queries.

GLASS ROOM.

Sir,—So long ago as the 28th of January last, you intimated that several of your correspondents had asked for information on the above subject, and requested your readers to favour you with particulars respecting the most convenient arrangement as to ground plan, fittings, elevation, and aspect, with the estimated cost, &c. I do not find, however, that any one has complied with your request—except that Mr. Doubleday has given a description of his *calico* tent in No. 25, p. 295; as to which a correspondent in No. 48, p. 263, says, that in an imitation one he cannot succeed in taking portraits in it. The subject certainly deserves consideration, especially as so little is to be found in photographic literature bearing on the subject. Perhaps the most that has been written on it is to be found in Mr. Lake Price's work; but, notwithstanding the many useful and practical suggestions by so high an authority, there seems to be still wanted a further elucidation of the subject,—for instance, as regards the form of roof, which is there strongly recommended to be circular, as possessing more evenness and ensuring greater rapidity than a roof in the slope form. Photographers generally do not seem to have acted upon this suggestion, for of all the glass rooms I have yet seen I do not remember one with a circular form of roof. Being myself about to erect one, I should much like to see this matter thoroughly discussed in your pages; and if any of your correspondents will enter into it, and also give a detailed estimate for one, say 20 × 12 or 16 × 10, with such illustrations as your may think fit, it would be a great boon to all photographers.

I may add, that I have been informed by several experienced horticultural builders that the circular form involves a very much larger outlay. A Young Beginner.

THE LINSEED DRY PROCESS.

Sir,—I have been testing the dry process with linseed, mentioned by Mr. W. Hughes, page 130, vol. ii. of your valuable publication. On trying a plate some few days ago, and following the directions given, I kept the plate only three days, then exposed and developed with the following solution, which is the one I succeed best with in the wet process:—

Pyrogallic acid	3 grains.
Acetic acid	30 minims.
Alcohol	10 ,,
Water	1 ounce.

The picture comes out a light red colour, and after al detail is out, I strengthen with silver and pyro; it then changes colour, becoming a dark bistre and ultimately a beautiful negative in point of detail, half-tones, and depth. I wash and fix with cyanide 10 grs. to the oz.; wash well, that is, *if* the film does not double over, and tear to pieces, which it is almost sure to do; but if it should not do so, then on drying, it cracks instantly, sometimes half across the picture, or the film rubs off with the slightest touch. Now, does this arise from not using a collodion prepared expressly for the dry process, or is it some fault in my manipulation, or from the strength of the linseed? Another failure is the number of pinholes which will persist in coming in the sky. Could any of your correspondents who have been trying this process kindly tell me the cause of my failures? G. A. M.

REVERSED ACTION OF LIGHT.

Sir,—Since writing the letter published in the "News" of August 19th, a friend has lent me a copy of a recent edition of "Hennah's Collodion Process," in which the writer mentions the occurrence of the same phenomena as observed by myself. He states that different portions of the same picture sometimes presented the characters of a transparent positive and a negative, and attributes the cause to a peculiar condition of the nitrate bath, which only happens when the bath is newly prepared and perfectly neutral.

He suggests as a remedy the addition of a little ammonia and supersaturation with acetic acid. I may observe that my own bath, at the time I took the pictures, was in precisely this condition, and since the application of the remedy the effect has ceased, but I still think it is partially owing to the mode of development, as I always noticed the reversal to occur after rinsing the plate with water and a fresh application of the developer. The production of these pictures no doubt opens an extensive and interesting field for inquiry with a view to ascertain the conditions on which they may be obtained with certainty; and also in connection with the present theory of the production of pictures by the agency of light on a sensitised surface, which would seem to be in some degree faulty or imperfect, as affording no explanation on the subject. W. H. Burnand.

MARKINGS IN THE FOTHERGILL PROCESS.

Sir,—In No. 51 of the "Photographic News" a correspondent states that the water markings in the Fothergill process are prevented by washing the plates in a dish, instead of under a tap. Now, I have prepared some scores of plates by this process, for printing transparencies, and, in nine cases out of ten, several of these markings appeared; however, they did not so much matter in transparencies. I have never tried this process for negatives, having from the first been perfectly successful with Taupenot's. I may here mention, that having once prepared some plates when my room was slightly damp, every one of them blistered in developing.

I believe that this is the chief cause of blisters both in this process and Taupenot's, and not the collodion.

H. M.

CHEMICALS AND VEGETATION.

Sir,—Many correspondents having inquired whether the employment of waste developing solutions, &c., in the watering of plants is likely to injure them, I beg to inform them that the cyanide of potassium used in fixing, which will probably abound in the waste liquor, would injure or kill the hardiest greenhouse or any small out-door plants. It would be almost as wise to *water* (!) them with the sulphuric acid at once. The employment of developing solutions in this way, will tend to check the development of the plant.

A. Watt.

CONVERTING POSITIVES INTO NEGATIVES.

Sir,—Will your correspondent Mr. Fowler kindly add to the information already given of the process of converting positives into negatives (vol. ii. p. 299), the best method of *fixing* after the conversion; as in some recent experiments I have found a tendency in the ordinary fixing solutions to remove the picture entirely from the glass?

One in a Fix.

CLEANING OIL PAINTINGS.

Sir,—I should feel much obliged if any of your numerous correspondents would answer the following question:— "What is the best method of cleaning old oil paintings and revarnishing them?" Inquirer.

ANSWERS TO MINOR QUERIES.

Glycyrrhizine.—*John C——e.* We are glad to find our correspondent has been so successful in his employment of this chemical. There is no doubt, that in the hands of a person who is experienced in its use, glycyrrhizine would prove of great service in many photographic operations; but, at the same time, it is very dangerous in the hands of a tyro, who must make up his mind to spoil several baths and numerous batches of collodion, if he determines to gain the experience necessary for the judicious and satisfactory employment of this body. Mr. Hardwich, in the last edition of his valuable book, gives the following directions for its preparation:—Procure fresh liquorice root, and slice it very finely *transversely;* then pound well in an iron mortar, and add as much boiling water as will just cover it. Stand the jug in a warm place for twelve hours, and afterwards press out the juice as far as possible by means of an iron screw press. Evaporation by artificial heat is useless, and serves only to decompose the glycyrrhizine. Mix oil of vitriol with an equal bulk of water, and allow it to cool; then add it to the strong infusion, until test paper becomes immediately red when dipped in the liquid, and a thick yellow deposit forms. A few drachms more or less of the sulphuric acid make but little difference, but if too much be used, the trouble of washing out the acid from the glycyrrhizine is increased. Leave it for twelve hours, when the yellow deposit may be collected on a cloth. Begin by draining it nearly dry, and then wash it with a moderate quantity of water to remove the excess of sulphuric acid; now squeeze it in a powerful press until it is dry enough to powder in the hand, and digest it without heat in absolute alcohol about four or five times its weight. The pure glycyrrhizine dissolves, and a bulky mass of vegetable albumen is left behind. Lastly, evaporate at a temperature not higher than 120° Fahrenheit.

Beaufoy's Acetic Acid.—In most cases where glacial acetic acid is recommended, that known as *Beaufoy's* acid may be substituted with economy. It contains 30 per cent. of the real acid, and is thus of the strength of the acetic acid fortis. of the London Pharmacopœia. When employed in any formulæ to replace glacial acetic acid, it should be added in such larger proportion as to make the amount of real acid added equal in both cases, and allowance must also be made for the extra amount of water thus introduced. One drachm of glacial acetic acid is represented by 3½ drachms (nearly half an ounce) of Beaufoy's acid.

TO CORRESPONDENTS.

Aliquis.—From the universal browning of your sensitive negative paper, we think that the fault must be in the acetic acid employed You say that the paper, chemicals, and everything else are the same as when you succeeded in taking good negatives; this, however, can hardly be the case, every result is preceded by a cause, and a slight decrease in the strength of your acetic acid is the most likely cause for the browning of calotype paper: perhaps, also, the acetic acid does not quite come up to that state of absolute purity which is so necessary in the calotype process. First try the effect of increasing the dose of acetic acid in your sensitising and developing solution, and then, if that be ineffectual, procure some fresh glacial acetic acid. It should be *solid*, at the usual temperature of a cold cellar at this time of the year. With respect to your query about orange glass, in the absence of direct experiments with different samples, your safest plan will be to choose a sheet of as *dark* a colour as possible. Do not employ yellow glass, as it is valueless.

H. L. W. P.—We have not heard a single authentic case of injury having been the result of the employment of cyanide of potassium to remove silver stains from the fingers. Of course, if a person will drink or permit others to drink his cyanide fixing solution, he must expect serious consequences to follow; but the same might be said of the nitrate bath, the alabastrine solution (corrosive sublimate) and many other solutions used by the photographer.

Feeler.—M. Becquerel is, we believe, the only person who has really succeeded in producing a *bona-fide* impression of the solar spectrum in its true colours. We have seen his results ourselves, and we can assure our correspondent that the colours are really what he states them to be—real decided colours, not merely faint tints.

Silverpen.—We thank our correspondent for the information so kindly proffered, but in its present form the letter would be open to the suspicion of having been inserted for the purpose of recommending the particular makers mentioned, and we cannot, therefore, break through our rule of excluding all such communications.

Chemicus.—Chloride of silver is entirely decomposed by being shaken up with a solution of iodide or bromide of potassium with formation of chloride of potassium and the corresponding silver salt. The reaction constitutes what is called, in chemical language, a double decomposition, and is thus written—$AgCl + KI = AgI + KCl$.

W. B. H.—Additions to the list published in our first number will be given as soon as a sufficient number of names have been received. Ample notice was given several weeks ago, and this was repeated nearly every week up to the time of publishing the list.

J. B.—We cannot, as a general rule, hold ourselves answerable for any statements or communications made through our advertising columns. We will, however, consider the matter referred to, and see if we can consistently interfere.

A Lady Amateur.—The rocking movement of the plate should commence as soon as the collodion has been poured back into the bottle; the object is to prevent the occurrence of reticulation and markings consequent upon the collodion flowing off in one direction only.

F. P.—Use a colourless cadmium collodion, and a bath only faintly acid with acetic acid; you will then not have to complain of no half tones, but, if anything, the reverse. This you may remedy by mixing some of your present collodion with the above.

A. N.—We will forward what you desire shortly. We feel highly flattered by your favourable opinion of the "News" and ourselves.

J. W. Love.—You had better write to the gentlemen. We cannot give space for the insertion of merely private notices to a few persons.

F. M.—The three pictures have arrived safely. We should be very pleased to see your views of the Lake district when ready.

P. S.—1. We intend shortly to give such a description. 2. A developing solution such as you desire was given in our first volume, p. 240.

A Youth.—We decidedly recommend the positive prints to be washed before they are toned or fixed.

P. H. D.—There is too much acid present in the bath and developing solution.

J. T.—The picture is both badly printed and mounted.

H. M.—The prints you mention will be received with pleasure.

W. S.—Received. See answer to "L. D'E." in our last number.

C. S.—Received. See answer to "H. H." in our last number.

D., Tullow, and other correspondents, will be answered in our next.

J. S. O.—We will forward the letter to the person named.

Communications declined with thanks.—T. A. B.—Hypo.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—X. Y. Z.—P. L. E. A.—John M. C.—O. P.

In Type:—M. Leon Foucault.—M. A. Scheurer-Kestner.—M. Le P. Secchi.—M. Van Monkhoven.—J. N.—M. A. Root.—J. S. Overton.—G. R.—W. L.—G. H. W.—I. W. W.—Doubtful.—H. and J. Walter.—William Boyer.—T. P. Bath.

Erratum.—In the "Chemistry" of last number, the word nitrogen should have been derived from two Greek words, signifying *I engender Nitre.*

Cases for Binding Volume II. have been prepared, price 1s. 6d. each. Subscribers may have their copies bound by the Publishers, in the usual manner, price 2s., including the cloth case.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 55.—September 23, 1859.

MEETING OF THE BRITISH ASSOCIATION.

The meeting of the British Association this year has been distinguisbed by some unusual circumstances, and has consequently presented greater attractions. In tbe first place, the President this year is no less a personage than tbe Prince Consort; and this in itself is an attraction to many people, and is, moreover, gratifying to scientific members of the Association, as showing the appreciation of its labours in high places. The meeting did not, however, require this *prestige* to make it attractive to those who love science for its own sake, since the list of the names of those, both English and foreign, who intended to be present, included many of the most eminent men of the day, thus rendering it certain that a vast deal of interesting information would be presented to the meeting.

The opening speecb of Prince Albert, as president of the meeting, was distinguished by that earnest, frank, and manly eloquence wbich characterises all his speeches, and invariably gratifies bis hearers. On the present occasion he paid some well-deserved compliments to bis predecessor in tbe cbair, Professor Owen, and dwelt on his comparative unworthiness to preside over a body of such distinguished men with an unaffected humility, which sat well on a man who is well known to possess as much general information as anybody in the kingdom. In the course of his speech, he referred to the aid to knowledge which might be derived even from our sports, and dwelt on the appropriate selection that had been made of the place of meeting on this occasion; on the interesting collection of antiquities which was offered to their view; and to the necessity which existed for the formation of the Association, the object of which was well expressed in the words of Mr. Vernon Harcourt:—"To give a stronger impulse, and more systematic directions, to scientific inquiry; to promote the intercourse of those who cultivate science in different parts of the empire with one another, and with foreign philosopbers; and to obtain a more general attention to the objects of science, and a removal of any disadvantages of a public kind which impede its progress." He dwelt at some length on the objects which scientific men had in view in making their researches, the rapid progress whicb science had made in these latter days, on the tendency to create new sciences, which be tbought might be inseparable from such progress, inasmuch as the acquaintance with and mastering of distinct branches of knowledge enabled the eye, from the newly-gained points of sight, to see the new ramifications into which they divided themselves. At the same time, science approached no nearer to the limits of its range, and the mind was struck with no less awe as every improvement in the power of the telescope brought fresh worlds to our knowledge, than when the microscope revealed to us in a drop of water, or an atom of dust, new worlds of life and animation, or tbe remains of such as had passed away. He enlarged on the value of the Association as a means of bringing all the divergent branches of science together, so as to show tbeir relative bearing on each other, only excluding from their consideration those sciences which are termed moral and political. He referred to the formation of the new Association for the Advancement of Social Science, which he considered worthy of admiration and goodwill. The desire of tbe Association to economise labour had been shown lately by their having, in conjunction witb the Royal Society, begun the compilation of a classified catalogue of scientific memoirs, which, by combining under one head the titles of all memoirs written on a certain subject, will, when completed, render reference to them easy. The peculiar value of the Association had been shown, not merely in its attention to the bearing of any particular scientific discovery on the others, but also in its pointing out where openings for research existed which had been hitherto overlooked. These openings are either such as the philosopher alone can successfully investigate—because they require the close attention of a practised observer, and a thorough knowledge of the subject; or they are such as require the greatest possible number of facts to be obtained. The expenses attending these investigations being generally defrayed by a grant from the funds of the Association, which grants, since its foundation, amount in the aggregate to £17,000; the whole of which sum was derived from the contributions of the members. The most searching observations are carried on by the Association in the observatory at Kew, with the view of testing the relative value of methods and instruments, and guiding the constantly progressing improvements in tbe construction of the latter. The exertions of the Association, in connection with the Royal Society and the Frencb Institute, led to the foundation of magnetic and meteorological observatories in six different parts of the globe, from which much might be hoped. The same English societies had suggested the Antarctic expedition, with the object of furthering the discovery of the laws of terrestrial magnetism, which had led to tbe discovery of the southern polar continent. His Royal Highness paid a warm tribute to the memory of the great philosopber, A. Von Humboldt, and concluded by remarking on tbe opportunity the meeting gave for one learned man to learn something from another who had cultivated a different branch of science. "The geologist learns from the chemist that there are problems for which he had no clue, but which that science can solve for him; the geographer receives light from the naturalist; the astronomer from the physicist and engineer, and so on; and all find a field upon which to meet the public at large, invite them to listen to tbeir reports, and even to take part in their discussions, and to show to them that philosophers are not vain theorists, but essentially men of practice; not conceited pedants, wrapped up in their own mysterious importance, but humble inquirers after truth, proud only of what they may bave achieved or won for the use of man. Neither are they daring and presumptuous unbelievers—a character which ignorance has sometimes affixed to them—who would, like the Titans, storm heaven by placing mountain upon mountain, till hurled down from the height attained by the terrible thunders of outraged Jove; but rather the pious pilgrims to the Holy Land, who toil on in search of the sacred shrine, in searcb of truth—God's truth—God's laws as manifested in His works in creation."

As at present arranged, the Sections are constituted as follows:—

A.—Mathematical and Physical Science.—President—The Earl of Rosse.

B.—Chemical Science.—President—Dr. Lyon Playfair.

C.—Geology.—President—Sir Charles Lyall.

D.—Zoology and Botany, including Physiology.—President—Sir W. Jardine, Bart.

Sub-section D.—Physiology.—President—Professor Sharpey, F.R.S.

E.—Geography and Ethnology.—President—Rear-Admiral Sir J. C. Ross.
F.—Economic Science and Statistics.—President—Colonel Sykes, M.P.
G.—Mechanical Science.—President—Robert Stephenson, Esq.

Section B, presided over by Dr. Lyon Playfair, was greatly crowded; the Prince Consort being one of the audience. The chief topic of Dr. Playfair's address was the combining proportions of the elementary bodies,—a subject, the great importance of which had been pointed out by Sir John Herschel, who regarded the ascertaining whether the combining proportion of the elements were multiples of the combining proportion of hydrogen gas, as suggested by Prout, as worthy of the most accurate experiment. Dr. Playfair congratulated the section on the publication of the laborious researches of Dumas, a distinguished French chemist, on this point. The atomic weights found by Berzelius did not, for many of the simple bodies, confirm the suggestion of Prout as to the multiple relations of these numbers to the equivalent of hydrogen. At the same time, the more recent determinations for the atomic weights of carbon, silver, and some other elements, so closely coincided with this view, that it was very desirable to extend new experiments to the bodies which had fractional atomic weights assigned to them. In some instances, M. Dumas obtained numbers of precisely the same value as those given by Berzelius' method—numbers which are not the multiple of the equivalent of hydrogen; but, on pursuing his experiments by methods which occurred to him in the course of his labours, atomic weights were obtained which corrected themselves from the error inherent in former methods of analysis, and resulted in being multiples of the combining proportions of hydrogen, or in standing in very simple relation to that number. The result of the elaborate investigations that had been made seemed to confirm the general view of Prout, that the equivalents of the elements, compared with certain unities, are represented by whole numbers, though it cannot yet be said that there are not exceptions to this last rule. M. Dumas concludes that the equivalent of simple bodies belonging to the same family progress by differences, in the same manner as homologues in organic chemistry; this part of his paper would not be likely to meet with the same ready acceptance by chemists as the less speculative portion of his investigations. The learned doctor referred to the ingenuous discussions on the natural grouping of the elements and the relations of their equivalent numbers to each other, with which we are familiar. As regarded equivalents, another question of a different character had lately received attention, and this was the proposal to double the equivalents of carbon and oxygen, to raise them from 6 and 8, to 12 and 16 respectively. The right determinations of these two equivalents, he observed, was of great importance, as the whole system of chemistry was essentially connected with these two elements. There were cogent reasons for inducing many able chemists to double these equivalents, but an alteration would produce such a change in the literature of the science that it ought not, even if true, to be adopted, unless the advantage to be derived from it were such as to justify the inconvenience which would result. It was intended to bring this subject before the Section on a future occasion. The proposed change had resulted in a great measure from the new views of the classification of organic compounds, introduced by Gerhardt. The progress in organic chemistry had resulted in the discovery of a vast number of new compounds; a scheme of classification of them became necessary, and the genius of the great French chemist produced a system which has exercised a great effect on the advancement of the science, promoted as it had been by such men as Williamson, Hunt, Odling, and Brodie. An opportunity would be given of tracing its effect on the advancement of science by the report on the state of organic chemistry, which would be presented by one of the gentlemen just named. Another of the members of the Section, who thinks the system might be improved, intends to present a paper, proposing a modification of the prevalent system of classifying compounds. The distinguished professor concluded by congratulating those present on the large muster of English chemists in the Section over which he had the honour to preside.

On the conclusion of the address, Professor G. Wilson made a statement of the stages which led to the invention of the modern air pump, which he illustrated with the aid of some beautifully-constructed diagrams. He was succeeded by Dr. J. H. Gladstone, who read a short paper on the "Phosphorescence and Fluorescence of some Diamonds," which led to a discussion, in which Sir David Brewster, Dr. Robinson, and Professor Wilson joined. Dr. Robinson offered to make some experiments, with respect to this subject, in the course of his lecture delivered last Monday evening, which we may, perhaps, refer to next week. A paper was next read on the "Comparative Value of certain Salts for rendering Fibrous Substances Non-inflammable." The researches on this subject were stated to have been first undertaken at the suggestion of Her Majesty.

A highly interesting address was delivered by Sir C. Lyall on the subject of geological investigations. He began by observing that great interest had been lately excited in the public mind by the question of the antiquity of the human race; whether or not we have sufficient evidence that man co-existed with certain extinct mammalia, in the fact that, during the last quarter of a century, his remains had been discovered in different parts of Europe in caves and in superficial deposits, called drift or diluvium, along with the bones of the extinct hyena, bear, elephant, or rhinoceros. These discoveries had given rise to the opinion that the date of man must be carried back farther than had been heretofore imagined. Scientific reasoners were reluctant to admit the validity of such evidence, seeing that so many caves had been inhabited by a succession of tenants, and had been selected by man, not only as a place of domicile but of sepulture, while some caves had also served as the channels through which the waters of flooded rivers had flowed, so that the remains of living beings who had peopled the district at more than one era might have subsequently been mingled in such caverns and confounded together in one and the same deposit. The facts brought to light during the systematic investigation of the Brixham cave, must have prepared people "to admit that scepticism in regard to the cave-evidence in favour of the antiquity of man, had previously been pushed to an extreme." To escape from what he now considered a legitimate deduction from the facts already accumulated, it was necessary to resort to hypotheses, requiring great changes in the relative levels and drainage of valleys, and in the whole physical geography of the respective regions where the caves were situated—changes that would alone imply a remote antiquity for the human fossil remains, and make it probable that man was old enough to have co-existed, at least, with the Siberian mammoth. In the course of the last fifteen years, another class of proofs had been advanced, in France, in confirmation of man's antiquity, into two of which he had personally examined in the course of the present summer. In the year 1844, M. Aymard, an eminent palæontologist and antiquary, published an account of the discovery in the volcanic district of central France of the skulls, teeth, and bones of two human skeletons imbedded in a volcanic brescia, found in the mountains of Denise—a brescia anterior in date to at least one of the volcanic eruptions of that mountain. On the opposite side of the same mountain, the remains of a large number of mammalia, most of them of extinct species, had been found in tufaceous strata, believed to be of the same age. He, together with some other distinguished men, had investigated the circumstances on the spot, and they were inclined to believe that the human remains were really imbedded in the matrice in which they were found by natural causes; but from examinations they had made, it seemed probable that the stone in which

they were imbedded was some of the old brescia which had been broken up and re-deposited. But this was merely an hypothesis; he had only to declare that in his opinion they afforded no demonstration that man had witnessed the last volcanic eruptions of central France. The skull appeared of the same type as that of the modern European, and the bones had a fresher appearance than was exhibited by those of the *Elephas meridionalis* and other quadrupeds found in any brescia of Denise, which could be referred even to the period of the latest volcanic eruptions. He was prepared to corroborate the conclusions which had been recently laid before the Royal Society by M. Prestwich, with respect to the age of the flint implements associated in undisturbed gravel at Abbeville and Amiens, in company with the bones of elephants; and that he had himself obtained abundance of these implements during a short visit he had made to those districts. Two of the worked flints lying upon the table were found at Amiens, at a depth of 10 and 16 feet below the surface, at the time of his visit, and an enormous number of them had been discovered within the last few years in the valley of the Somme. The stratified gravel resting on the chalk in which these rude instruments lie buried, belonged to the past pliacene period, all the fresh-water and land shells which accompany them being of existing species. He thought a tribe of savages, to whom the use of iron was unknown, must have inhabited this region for a long period. He had seen an Indian mound in Georgia, the area of which was ten acres, with an average height of five feet, which was principally composed of oyster shells, among which were dispersed arrow-heads, stone axes, and Indian pottery; and if the sea, or the adjacent river, were to wash away this mound, it might produce a very analogous accumulation of human implements, perhaps unmixed with human bones. Although the shells which are found along with the flint implements at Abbeville and Amiens are of living species, he believed the antiquity of those instruments to be great indeed, compared to the times of history or tradition. He considered the gravel to be of fluviatile origin, and it must have required a long period for the wearing down of the chalk which supplied the broken flints for the formation of so much gravel at various heights, sometimes 100 feet above the present level of the Somme, for the deposition of fine sediment, including entire shells, both terrestrial and aquatic, and also for the denudation which the entire mass of stratified drift had undergone. To explain these changes, he inferred considerable oscillations in the level of the land in that part of France—slow movements of upheaval and subsidence, deranging but not wholly displacing the course of the ancient rivers. Lastly, the disappearance of the elephant, rhinoceros, and other genera of quadrupeds, now foreign to Europe, implies a vast lapse of ages separating the era in which the fossil implements were formed, and that of the invasion of Gaul by the Romans.

We have not space to dwell any further at present on the papers read; nor have we yet received our report on the subject of the Photographic Exhibition. We can only say that it contains some excellent photographs by British artists, and some by foreigners.

PHOTOGRAPHY IN NATURAL COLOURS.*

BY M. E. BECQUEREL.

The influence of the thickness of the impressionable layer upon the effects obtained is enormous. When the layer is thin, it is tolerably sensitive, but still much less so than that of plates prepared with iodide or bromide of silver, in order to obtain an impression in the camera, but it is nearly as sensitive as the plate iodised by Daguerre's method; and if the sensitiveness of a thin layer be sufficient, its effects of colour are very weak. By using a thicker layer, the matter is rendered less susceptible, but the colours are brighter. In proportion as the layer becomes thicker, its sensitiveness becomes gradually diminished, but the coloured reproductions are more beautiful. There is a certain means of ascertaining the relative thickness of the impressionable layer of chloride, which may be used under the same conditions of preparation. This consists of introducing into the voltaic circuit formed of the pile, the plate, and the bath of hydrochloric acid, an apparatus for the decomposition of water, so that the electric current which liberates chlorine upon the surface of silver, may at the same time decompose the water in the second apparatus; and since the electro-chemical decompositions always occur in definite proportions, the same quantity of chlorine will be deposited upon the silver as would be withdrawn from the hydrogen in the apparatus for decomposing the water. Thus, supposing that the voltameter indicates 5, 6, or 7 cubic centimetres of hydrogen, one may be certain that a similar number of cubic centimetres of chlorine will be deposited upon the surface of the silver. In operating in this manner, it is easy to ascertain every moment, and during the preparation of the sensitive layer, the exact quantity of chlorine deposited upon the surface of the plate. I have ascertained that, in order to obtain the layer, the thickness of which should correspond with the third degree of thin plates, that it would require three cubic centimetres of chlorine to the square decimetre, and under these conditions tolerably good reproductions of prismatic coloured images are obtained. If you go to 6 or 7 cubic centimetres to the square decimetre—that is to say, to the thickness corresponding to thin plates of the fourth degree, when very good effects are required, it is there you should stop. To give some idea of the real thickness of the layer, I should say that with four cubic centimetres of chlorine to the square diameter, the layer should be about one-thousandth of a millimetre in thickness. When the luminous spectrum is projected upon a silver surface prepared with 6 or 7 cubic centimetres of chlorine to each square decimetre, which surface has a plain wood colour, the portion struck by the prismatic red is red, turning to a very deep red near the least refrangible extremity; the yellow is scarcely visible, the green is very perceptible, the blue and violet are superb and precisely the same tints as those of the spectrum. Indeed, the shades, though similar to those of the acting luminous spectrum, are rather darker, excepting those at the bottom of the plate, which remain rather brighter; but, as will soon be seen, the surface can be modified, after being withdrawn from the bath, and before being submitted to the action of the spectrum, so that the colours are very much more beautiful.

This substance, which may be considered to be an inorganic retina, is capable of very remarkable modifications. Whether by the action of heat, or by that of certain portions of light, upon elevating the temperature of the chloride, but not sufficiently so as to cause its fusion (say 150 or 200 degrees cent.), it will be seen, that the tint, after cooling, becomes rose colour; and, if the spectrum be thrown upon the substance thus modified, the effects are quite different to what they were previously. The limits of action are nearly the same as before—that is to say, are those of the solar spectrum; but the yellow and the green, although pale, are clearly defined, and the ground has become darker; and if the action of the spectrum be too much prolonged, the final result would be white instead of grey, which it would have been before the experiment. If the plates be heated beyond 150 degrees, the physical transformation of the matter causes the disappearance of nearly the whole of the colours; but if the experiment be submitted to a very low but very prolonged temperature, it will be no longer the same. Thus, if the plate be placed inside a copper box, and introduced into a stove heated to no more than 30 to 35 degrees, and the elevation of temperature be maintained for four, five, or six days, then the coloured prismatic impressions are very beautiful. Not only do the different colours—red, yellow, green, blue, violet—situate in the places on which have acted the rays of the spectrum of the same colour, become clearly defined upon a dark ground; but

* Continued from vol. iii. p. 15.

a beam of white light causes a white tint on the place on which it acts. The sub-chloride of silver likewise receives from the extreme red rays of the solar spectrum a physical modification, as remarkable as by the action of heat, and by another process offers very beautiful coloured reproductions of the solar spectrum. To obtain this result, a prepared plate, just as it is taken from the bath, after the action of electricity, is placed in a frame covered with a deep red glass (coloured by the protoxide of copper), and the whole is exposed to the solar rays. After an exposure of from fifteen to thirty minutes, the plate becomes blacker than at first, and the same effect is produced as that exhibited in the least refrangible extremity of the spectrum. Whilst this colouring is taking place, the sensitive matter becomes modified by degrees, and, probably, in the same manner as by the action of heat. If, then, the solar spectrum be directed upon its surface, after a few minutes it appears with all its colours admirably reproduced; even the yellow and green portions which, before this operation, would have been dark and scarcely visible, are now very clearly defined. The previous action of the red rays should not be too much prolonged, or the matter will become less sensitive.

(*To be continued.*)

OBSERVATIONS ON THE NITRATES OF IRON.

BY M. A. SCHEURER-KESTNER.

When a solution of nitrate of iron is left to itself for any lengthened period, it sometimes happens that it gelatinises, and appears turbid. Upon diluting the liquid with water the jelly disappears, and there is obtained a liquid which is limpid when looked through, and turbid when viewed by reflected light; having great analogy with the acetate of iron modified by heat, and the knowledge of which we owe to M. Péan de Saint Gilles. It is known that the allotropic modification of oxide of iron has been obtained by means of acetate of iron, by submitting this salt to the prolonged action of a heat of 100° cent. I have submitted to the action of boiling water, for a similar purpose, neutral nitrate of iron, and the two soluble basic nitrates of which I have already given the properties and preparation. These salts have been inclosed in sealed tubes, and plunged into a water bath heated to ebullition. At the end of some hours the colour of the two basic salts was considerably modified—from a brown red they had passed to a brick red—and the solution, limpid by transmitted light, appeared troubled when viewed by reflected light. Upon opening the tubes there was no apparent odour of nitric acid, but the basic salts had acquired new properties. A drop of sulphuric or hydrochloric acid, or of a solution of sulphate of soda or potassa, occasioned a precipitate in the liquid; before they had been submitted to the action of the heat these salts were only precipitated by strong nitric or hydrochloric acids, and not at all by sulphate of soda. After ten hours' ebullition, a portion of the tri-basic nitrate, $Fe_2O_3 . NO_5$, separated from the precipitate by sulphate of soda, gave on analysis the following numbers:—

12·525 grammes of liquid produced 1·186 grammes of peroxide of iron, and 2·022 grammes of carbonate of lime, equal to 2·2039 of NO_5, or, in percentages—

NO_5	17·60.
Fe_2O_3	9·88.
Water	72·52.

The oxide of iron and the nitric acid are found in the ratio of 1 : 1·781, whilst originally this ratio was 1 : 0·68. At the end of seventy-two hours' exposure to heat, the liquid separated from the precipitate, as before had the composition of nitrate of iron with three equivalents of acid. There the action of heat stopped; the neutral nitrate has not been modified even by an exposure to a temperature of 100° cent. during 144 hours. The two basic salts are thus the only ones susceptible of being modified.

The precipitate obtained by means of sulphate of soda dried on warm porcelain and in a current of dry air, forms little black plates, insoluble in strong acids, but very soluble in pure water, reproducing a solution, clear by transmitted, and turbid by reflected, light. This remarkable solution gives neither, with ferro-cyanides nor sulpho-cyanides, the characteristic reactions of the salts of iron, and may be re-precipitated by acids and by sulphate of soda, producing again the soluble oxide of iron. This oxide has given, on calcination, numbers which very nearly approach those of M. Péan de Saint Gilles:—

0·583 of substance gave 0·524 of oxide, or, in percentages—

Fe_2O_3	89·88.
HO	10·12.

The formula $Fe_2O_3 . HO$ requires—

Fe_2O_3	89·89.
HO	10·11.

0·682 of the oxide precipitated after 144 hours' ebullition gave 0·626 of oxide, or, in percentages—

Fe_2O_3	91·70.
HO	8·30.

Thus heat exerts on the two basic nitrates an analogous action to that which it produces on the peracetate of iron, with this difference: that while the ferric acetate is decomposed in a complete manner into oxide of iron and acetic acid, the basic nitrates are decomposed into oxide and neutral nitrate—this last salt resisting decomposition.

Light exercises upon these bodies the same action as heat, and it is to this agent that must be ascribed the decompositions which are sometimes produced in solutions exposed for some time to the air. Three flasks, properly stoppered, and containing the three soluble nitrates, were submitted to insolation for five months (from December 21, 1858, to May 21, 1859). The neutral nitrate of iron had preserved its limpidity and original composition, while the two basic salts were in great part modified. Already, at the end of three months' exposure, the liquids had become precipitable by sulphuric acid and sulphate of soda. The same salts, kept in darkness for the same time, had preserved themselves perfectly, without undergoing any change in their composition.

There thus exists a notable difference between the decomposition which these salts undergo at the temperature of boiling water and that which is occasioned by their own ebullition. On the one hand, they decompose without losing their elements; while, on the other, they split up into a more basic salt and free acid which is evolved.—*Comptes Rendus.*

THE "NEW ACTION OF LIGHT."

It is to M. Nièpce, says a foreign contemporary, that is owing the observation that an insolated solution of starch or dextrine is partly converted into glucose. M. Davanne, recollecting that glucose easily reduces nitrate of silver, and that the major part of papers of French fabrication are sized with starch, finds in this fact the explanation of many of the phenomena observed by M. Nièpce. M. Barreswill, on the other hand, doubts the transformation of starch into glucose, from the mere action of the light, and believes that M. Nièpce must have operated with starch mixed with nitrate of uranium or some other substance capable of producing the same result. Starting from this assumption, M. Barreswill says, that the salt of peroxide of uranium is converted into an inferior salt: hence it results that the liquor, which, in the first place, contained a neutral salt,

contains, after, insolation, a mixture of less oxygenated salt of uranium and free acid. It is to the presence of this acid that must be attributed the conversion of starch into glucose. From this flows the explanation of that other fact observed by Niepce, that the yellow salts of uranium insolated in presence of an organic substance reduce the salts of silver. In fact, an inferior salt of uranium is formed at the expense of the oxidised organic matter.

Dictionary of Photography.

FRAUNHOFER'S LINES (*continued*).—M. Edward Becquerel has given some interesting particulars respecting the lines in the spectrum. His account is the more valuable, as we believe him to be the only experimentalist who has succeeded in obtaining a photograph of the solar spectrum in all the beauty of its natural colours. His arrangement of the apparatus is as follows:—In the path of a solar ray reflected from a mirror and passing through a narrow vertical aperture, is placed a very pure prism of flint glass, having its edge vertical and disposed in the direction of the minimum deviation: then immediately behind the prism is interposed a lens of about one metre (39·37 inches) focal length. If the prism is situated at a distance from the aperture equal to 2 metres (78·74 inches), or twice the focal length of the lens, and if a white surface is placed at two metres from the prism, then the lines of the spectrum will be very well depicted upon its surface. Without a converging lens we could not distinguish the lines by projection. In order to see the fine lines of the less refrangible parts of the luminous spectrum, it is necessary to have an aperture of only one-fourth of a millimetre (0·01 inch) in diameter, at the utmost; but in order to study the great lines, and especially the lines H and those beyond, the aperture must have a diameter of one or two millimetres (0·04 to 0·08 inch). In this case the two lines H of the extreme violet are very distinct, and we see some lines beyond, in the rays, whose colour is of a weak lavender grey tint.

Moreover, (and this remark is important,) the position of the lines depends solely on the relative positions of the aperture and the prism. The apparent movement of the sun does not make them change place; so that it is useless to have a heliostat for the purpose of keeping them in the same position; a simple light director, turned by the hand, serving the same purpose, only the spectrum is more or less illuminated.

On Daguerre's plates, simply iodised, the action of the exciting rays ceases towards the limits of the indigo, at G: but with respect to the plates which are iodised and afterwards exposed to the vapours of chlorine or bromine it goes as far as F, in the extreme blue by the side of the red.

The portion of the image which first appears is that which is contained between H and G; the maximum of action is then nearly between these two lines. If the action is allowed to continue, it does not extend beyond F, and, indeed, it suddenly ceases nearly at this ray, but extends, diminishing by degrees in intensity to beyond the higher visible rays. If the plates remain exposed for a long time to the action of the spectrum, there is an action which is manifested from F as far as the extreme red: this effect arises only from the action of the continuing rays, which act upon the impressed substance by means of the diffused light which accompanies the solar spectrum. This action may be obtained in a higher degree by impressing the whole plate at first.

The effect produced by allowing the solar spectrum to act upon paper washed over with a solution of bichromate of potassa has its maximum of action at the limit of the green and blue, or towards the line F. The action ceases almost instantaneously at the extremity of the green beyond the lines F and *b*; but on the most refrangible part of the spectrum it continually becomes weaker, so that towards M the colouration is scarcely sensible.

A paper washed over with an alcoholic solution of guaiacum which had been boiled previously several times in water, was coloured blue by the rays beyond the violet, the maximum being between M and N. When the paper has been previously rendered blue, and then exposed to the spectrum, it is bleached by the rays extending from the violet to the red, the maximum of action being at F.

On comparing the account given above by M. Becquerel of the action of the spectrum upon an iodised daguerreotype plate, with our own account of its action upon an iodised collodion plate given in the PHOTOGRAPHIC NEWS, No. 49, p. 266, we cannot help being struck with the agreement between the two results, in each case the action ceasing at about the line G. The account given above of the manner in which the photographic image first appears, and the position of the maximum of action, are also strictly similar to our own experience. We are also inclined to believe that the account given in the paragraph succeeding the above of the effect of prolonged exposure and the action of the continuing rays, throws great light upon the curious phenomena communicated by Sir John F. W. Herschel in No. 46, p. 229, of our last volume.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS.—GLASS POSITIVES—(*continued*).

HAVING arranged the dark room, and the preparation of the several solutions to be employed, we will now make the preliminary arrangements for taking a picture.

The student must make up his mind not to allow the slightest deviation from any of the rules laid down, otherwise he may not be successful in his endeavours. The various operations and processes must be pursued exactly in the order in which they occur, as the slightest mistake would be fatal to the result. At first, it will be advisable to go through the operations slowly and deliberately, not exhibiting too great eagerness to obtain results, lest in his enthusiasm some necessary detail be forgotten by the learner. Nor should the student suffer himself to be led astray by any apparent novelty which may exhibit itself. My reason for urging this is, that I know of old that the beginner is too apt, when he observes things which he has not seen written down, to fancy that he has made discoveries, and thus, whilst pursuing a phantom, he frequently loses sight of the path which leads to success. But I would not, however, deter him from making observations: he may do this with advantage; and I recommend him from the first to keep a note-book, in which he may enter any peculiarity which he may observe in practice, and hereafter, when more experienced in the art, and when he has made himself acquainted with the discoveries and improvements of others who have worked before him, by referring to his note-book, he will be able to separate his original observations from those which were already known before; and since photography is purely an experimental art, it is quite possible that, in the course of time, the student's note-book may contain some very useful memoranda.

A *positive* picture, as it is called, is one which, having something black placed beneath it, shows the object at once in all its details; and if the film-side is *downwards*, the object represented is exactly in the same position as the original; whilst, on the other hand, if it be viewed by transmitted light, it appears as a *negative*—that is, the object is reversed. The picture, however, as it is wanting in density, cannot be used as a negative for printing, as we will show hereafter.

In taking a positive picture, all that is required is to obtain a slight impression of the object upon a sensitised surface, which, when backed up with black varnish or velvet, will look brilliant and exhibit every detail of the original, even to the minutest degree. The plan to be pursued is as follows:—

Place some object on a table, say a common wine bottle, in such a position that a bright light (not direct sun-light), falls upon it; behind this pin up in any convenient way a white

cloth. Now place the camera, with the lens directly in front of the object, at a convenient distance, and remove the cap of the camera. Now put the *focussing glass*, with its smooth side towards you, in the grooves at the back of the instrument, and throw a piece of black cloth or velvet over your head and the camera, leaving the lens, of course, uncovered. By looking *at* the focussing glass, you will see the bottle upside down; now move the pinion which guides the lens backwards and forwards until you see the bottle *perfectly sharp*. When you have done this, in order to prove that you have acquired the art of focussing perfectly, turn the pinion about the sixteenth of an inch *outwards*, and examine the focussing glass again; when, if your first focus was right, the bottle will appear indistinct and misty. Now turn the screw about the same distance *inwards*, and view the ground glass again; when, if the object does not appear as distinct as it did at first, you can easily return the screw to the proper place; by proceeding thus, the eye will soon become accustomed to the art of focussing accurately.

Having obtained the proper focus, put the cap carefully over the front of the lens, and gently withdraw the ground glass.

Sensitising the plate is the next operation. The exciting solution must be poured into the bath, and the dipper, being quite clean, immersed. Then put a small quantity, say half an ounce, of the developing agent into the ounce measure, and place it near the vessel or sink, over which the developing and fixing operations are to be carried on. Now take one of the glass plates, and, keeping the best side upward, observe whether there are any small particles of dust upon it; if so, they may be removed either with the polishing leather, or, still better, with a badger-hair brush, kept for this purpose only. Then, carefully removing the cork or stopper of the collodion bottle, pass the little finger into the neck of the bottle, in order to remove any collodion which might have gelatinised upon the surface, and the outside of the neck should be treated in the same way; otherwise, when the collodion is poured on the plate, it will carry with it particles which will prove highly detrimental to the picture.

The plate is now to be held by one corner with the left hand, in a horizontal position, and the neck of the collodion bottle being brought as closely to it as possible, in order to prevent the formation of bubbles, sufficient collodion is poured on the centre to occupy the space of a five-shilling piece, and, by gently tilting the plate towards the left, the collodion will flow nearly to the corners, when, by slightly reversing the position of the plate, it will evenly flow to the other and opposite right-hand corner, when it may be allowed to run off at the right-hand corner nearest the operator, into the bottle. When the collodion has *nearly* ceased to flow, by a gentle rocking motion to and fro, whilst the corner of the plate is still in the neck of the bottle, the film will become uniform and not *reticulated*. When the collodion has ceased to flow, return the cork to the bottle and place the plate with the film forward upon the dipper; now, having closed the door of the dark room, immerse the plate in the bath promptly, but not with a jerk. The plate must remain in the exciting solution for about fifteen or twenty seconds, when the dipper and plate should be raised out of the bath a little way, and immediately returned: this may be done several times, but pretty quickly; then allow the plate to remain in the bath for about two minutes altogether, during which time the cover should be placed over the bath to keep out dust and light; then open the shutter of the plate holder, and insert the frame which suits the size of your glass. The plate may now be removed from the bath steadily and cautiously, holding the dipper in the right hand, whilst with the left the plate may be held either by one corner, or by its two edges, between the second finger and thumb. Having allowed the nitrate of silver to flow off the plate into the bath for about half a minute, one corner may be allowed to come in contact with a fold of blotting-paper, to drain it further, for a few seconds, and the back of the plate may be wiped with a small piece of damp rag, so as to keep the plate-holder dry. This part of the process, however, must not occupy more than a minute, from the time of removing the plate from the bath. The plate is now to be placed in the frame, collodion-side *downwards*, and the shutter gently closed and fastened, when it is ready for the camera.

Exposure in the camera is to be thus conducted:—Put the plate-holder in the grooves in which the focussing glass had been, with the shutter nearest the operator. Now gently lift the slide which is nearest the sensitised surface of the plate; and, lastly, remove the cap of the camera, when the plate will at once begin to receive the impression. If the light is good, probably from one to three seconds will be sufficient exposure; it will be better to under-expose at first rather than otherwise, in order to ascertain whether there is any evidence of "fogging"—an unpleasant peculiarity, which we will presently refer to again.

When the plate has been exposed for the time specified, the cap is to be promptly but carefully replaced, and the slide gently lowered. The plate-holder is then to be taken into the dark room, and the door closed. From this moment the operator must "keep his eyes open," that he may not overdo the process of development—a very common failure with beginners. Carefully remove the plate, holding it by one corner, film upward, and pour on (not from the lip of the measure) the developer; do this pretty quickly. If the plate has not been exposed sufficiently the picture will be slow in coming forth, whilst, if it has been "over-exposed," it will start out immediately, and there will be a tendency in the plate to appear as if the chemical action were taking place all over the plate instead of only at those parts where the light had affected it, such as the white background, and those parts of the bottle which reflected most light. If the plate has been properly exposed, the picture will develop quickly, but not suddenly. As soon as the whole of the details seem well brought out—which may be seen by holding the plate up to the light, or over something white, as a white piece of paper, for instance, water is to be poured over the plate for a few seconds. The picture generally comes well out in less than half a minute. Next pour on the fixing solution, which will at once remove all the unaltered yellow iodide of silver, and the picture must then be again well washed, when it may be brought out to the light and examined. It will be more distinctly viewed over a black surface.

If the plate has been over-exposed in the camera, it will exhibit an indistinct or misty appearance, and, if held up to the light, on looking *through* it, the silver deposited will appear of a reddish or purple hue; whilst, on the other hand, if the exposure has been insufficient, only the "high lights," as they are termed, will have become impressed—in other words, merely the outline and the light shining upon the bulb and neck of the bottle will probably be seen. The dark parts of the object should be quite clear and transparent; if this is not the case, it will be well to add two or three drops more acetic acid to the bath, and try another plate.

If the operator prefers it, instead of pouring on the developer, he may carry on this process by *immersion*, thus:—Put sufficient of the developing solution into a white plate, or flat porcelain dish, to cover the plate; and, when about to develop the picture, plunge it quickly into the solution, so that it may be all covered at once, otherwise, where the developer first attacks the plate, a line or mark will be visible, and the picture spoilt. Perhaps this is the easiest method for a beginner, as the white surface of the dish enables him to see the picture more clearly than when the developent is poured on the plate. If the developing is done by immersion, however, as soon as the whole image appears *nearly* brought out, the plate must be immediately taken out of the dish with the fingers—care being taken not to injure the film—and at once washed as before. This solution will not injure or stain the fingers.

If the fixing solution appears to act too quickly, as may be the case with a collodion which yields a very transparent, bluish film, it may be advisable to reduce the strength of it by adding an equal bulk of water.

After a perfect picture has been obtained, it must be well washed for a minute or so, and then be placed upright; after a few minutes, the plate may be held before a fire for a short time to dry it, but this must be done with care. A little positive varnish may then be poured over the film in the same way that the collodion was poured on, and the plate set aside to dry. A piece of black velvet placed at the back will show the picture well; or, if preferred, the film may be coated with good black japan varnish, sold for that purpose, and, when this is to be done, the plate need not be previously varnished with the transparent varnish.

The student, having for some time practised the art of taking pictures of objects near at hand, may next turn his attention to taking views of out-door scenery; but it will not be advis-

able to devote himself to portraiture until he has mastered the ordinary manipulations of exposure in the camera, developing, fixing, &c.

In taking an out-door scene, in order to render distant objects as well as those near at hand, equally in focus, it will be necessary to check the amount of light which enters the lens, which will be apparent at once if the operator, turning his camera in the direction of some chosen scene, at once proceeds to focus the nearest object to him, when he will find that all other objects beyond it appear misty, or not at all visible. Again, if he moves the pinion so as to bring in focus the most distant object, everything which is in the foreground will appear without form and void. To render, therefore, objects far and near equally *sharp—i.e.*, in focus—it will be necessary to employ what is called, technically, a "stop," or diaphragm. This may be readily made by cutting a piece of tin or card-board of such a size that it will fit into the front of the lens. A small hole of about the diameter of a fourpenny piece must now be cut in the centre of this, and the card be blackened on both sides, either with ink or black varnish; and when it is inserted in the brass collar in front of the lens, the student will find, on looking at the focussing glass, that all objects nearest the camera and farthest from it are equally in focus.

In taking a picture under such circumstances, the light being checked or "stopped" in its progress, as the operator will soon observe (for the view on the ground glass is comparatively dark), it will be necessary to give the plate a longer exposure in the camera than if the open lens (without a "stop") were used; probably three or four times the amount of exposure will be required, or more, which must depend, of course, upon the brightness of the day, independent of the state of the bath and collodion, which are more sensitive under some circumstances than others.

In photographing scenery, care must be taken not to select a view which is in the same direction as the sun, but it should be, as far as possible, in the opposite direction; otherwise the operator will be troubled by light entering the camera and producing fogginess, also the view will not be properly illuminated.

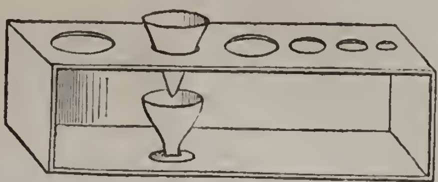
Having selected the spot, and after arranging the camera, the plate is to be prepared exactly as before, and exposed in the camera for a few seconds; if the sun shines brightly at the time, a single second ought to be sufficient. This, however, will soon be ascertained, for if the whole details of the scene are not forthcoming, the picture will look dark and gloomy, the development taking place slowly; doubling the length of exposure, if the picture appears about half done, will be sufficient for the next, if taken shortly afterwards, and under the same circumstances. The amount of exposure required must depend upon the operator's own judgment to a great extent, and he will soon find, after a little practice, that it is not very difficult to ascertain the length of time required for the plate to be in the cameras, as the difference between an under-exposed picture and one which has been over-exposed is as great as light is from dark.

(*To be continued.*)

The Amateur Mechanic.

GUTTA PERCHA—*(continued)*.

In the process of filtration it is a common practice to place the neck of the funnel in the bottle into which the filtrate runs; where an open vessel such as a developing glass is used instead of a bottle, a support of some kind is required. These supports are often made of wire, like retort stands; but a much more convenient support for the operating room may be made of gutta percha. It may be made of such dimensions as are most convenient. One about eighteen or twenty inches long by five or six inches wide, and six inches deep, would be a convenient size to contain apertures for half a dozen funnels of graduated sizes. The gutta percha should be moderately stout; the several parts joined as we have described in the formation of other apparatus. It is a good plan to keep each filter invariably to its own purpose, having the aperture to which it belongs labelled with its name. Placed upon a shelf or fixed against the wall near to the operating table, such a support for the funnels would be invaluable, and save much risk of injury to solutions often caused by using funnels with particles of other chemicals about them. The form is something like the following:—



As, in using gutta percha, every cutting can be made available, the ends need not be solid, but may be cut out in the form of an arch, as that will not in any degree injure the strength of the support. A developing stand for a number of plates may be made on this principle, adopting the plan we described last week.

Bottles of various kinds may be made of gutta percha. For containing hydrofluoric acid such bottles should always be used, as this acid, as our readers know, destroys glass; and lead, often used for the purpose, is less convenient than gutta percha. A glass bottle of the shape required will serve every purpose as a mould on which to fashion the material after it has been properly softened in hot water. It must, of course, be moulded in two parts, which are to be subsequently joined; in many cases it will be found most convenient to leave the bottom open, from which the mould can be drawn out; a piece may then be carefully cemented on, so as to complete the bottle.

The experimentalist in electricity and galvanism will find gutta percha a valuable material in the formation of batteries, acid pourers, &c.; and also as the best agent for insulating metallic bodies. As the mode of using it for those purposes will have been made sufficiently obvious in the instructions already given, it will not be necessary to enlarge on the subject.

We will close our remarks on the manipulation of gutta percha by a few hints on repairs. Injuries to vessels of gutta percha, whether from leakage of joints or other causes, can generally be repaired. The best mode of effecting this is by neatly joining a piece of gutta percha over the defective place. The vessel must be thoroughly dried, and the part to be repaired scraped quite clean. A thin piece of gutta percha of the proper shape, rather larger than the defective place, must be pared thin at the edges, then softened in hot water, and carefully dried. In order to cleanse the surface to be repaired from every possible portion of dirt or grease, it should be rubbed with a cloth dipped in benzol. It must then be softened slightly by the flame of a spirit lamp. The surface of the softened piece having been carefully cleansed from grease or dirt by means of benzol, the piece must be placed on the injured part of the vessel, pressing it firmly down, especially at the edges. The point, in effecting repairs, requiring especial attention is the removal of every trace of dirt, grease, or oxidization from the surface of the old vessel previous to applying the new piece. It must be remembered here, also, as well as in every manipulation with gutta percha, that to effect a joint, both pieces to be joined must be softened, as one piece of gutta percha that is softened will not adhere to another piece that is not softened. In softening gutta percha, two points must ever be borne in mind: that the hot water should not exceed in temperature 200° Fahrenheit, or there will be danger of some absorption of water; and that in applying a flame to soften it, whether of gas or a spirit lamp, care must be taken not to burn the gutta percha, or the joint will be imperfect. It will be easy to see when the gutta percha is burning, as it first discolours, then emits a smoke and disagreeable smell; when this has taken place, the nature of the gutta percha is altered—its strength and toughness being destroyed.

(*To be continued.*)

Photographic Chemistry.

CHEMICAL NOMENCLATURE—(*continued*).

Of all the elementary bodies, that which is the most diffused throughout nature is oxygen. It enters into the greater part of the important combinations, and the compounds into which it enters are those which have most occupied the attention of chemists. The result of this was to impress the minds of those who founded our system of nomenclature with

such a sense of its importance that some of its defects may be attributed to it.

The combinations which oxygen forms with other simple bodies are acid, basic, or neutral. To the basic and indifferent combinations the term *oxides* is applied; to the acid combinations that of *oxacid*, or simply *acid*. Thus, copper, lead, and iron form with oxygen basic combinations, termed respectively, *oxide of copper*, *oxide of lead*, and *oxide of iron*. Carbon combined with oxygen forms an indifferent combination termed *oxide of carbon*, and an acid body—*carbonic acid*.

At the time the nomenclature already given was arranged, it was supposed that a single body in combining with oxygen could not form more than *two* acid combinations. To name them it was arranged that the name of the bodies containing the smallest amount of oxygen should end in *ous*, and that containing the larger amount in *ic*, as, for example, in the case of the combinations with sulphur, that least oxygenised was termed *sulphurous acid*, and that containing a larger proportion of oxygen *sulphuric acid*. In the case of this particular substance, it was subsequently found that oxygen combined with it in a less proportion than in the compound known as sulphurous acid; and in a proportion between the sulphurous and the sulphuric acids. It was then decided that the word *hypo* (beneath or under) should be prefixed to distinguish them; thus the former was termed *hyposulphurous acid*, and the latter *hyposulphuric acid*. The difficulty was thus evaded for the moment, but it was not overcome. Within the last few years several new combinations of oxygen with sulphur have been discovered, to denominate which a new rule would have to be laid down, and it is probable that even this would be but of temporary avail.

The same thing has occurred in the case of the combination of oxygen with chlorine. Four of these combinations had been respectively distinguished as *hypochlorous acid*, *chlorous acid*, *hypochloric acid*, and *chloric acid*, when a fifth combination was discovered which contained more oxygen than either of the others, and which, according to the rules of nomenclature laid down, ought to have been called chloric acid, but as this could not be done without causing considerable confusion, another modification was adopted; the prefix *hyper* (above) was added, and the compound was thus termed *hyper-chloric*, or more simply, *perchloric acid*. After the above examples we need not enlarge further on the defects of the present system of nomenclature; but at the same time we must observe that it is now so thoroughly established that any change beyond a modification of it is, if not impossible, exceedingly improbable.

A single body, in combining with oxygen, frequently forms several basic or indifferent compounds; these are *oxides*. Experiment has shown that in these different oxides the oxygen combines with the other body in certain fixed ratios, as for instance, in the proportion of 2 to 1, 3 to 1, &c. The combination in which the amount of oxygen is equal to the other body is termed the *protoxide*, that containing it in the proportion of 3 to 2 *sesquioxide*, 2 to 1 *deutoxide* or *binoxide*, 3 and 4 to 1 *tritoxide* and *quadroxide* respectively. Those oxides which contain a smaller proportion than 1, are termed *suboxides*. It is also a common practice to term the oxide which contains the largest proportion of oxygen, a *peroxide*.

The rule which governs the nomenclature of salts is exceedingly simple. When the name of the acid terminates in *ic*, the salt formed from it ends in *ate*, and when the acid terminates in *ous*, the name of the resulting salt ends in *ite*. Thus *sulphurous acid* forms a *sulphite*; *sulphuric acid* a *sulphate*.

The acid and the base often combine in different proportions. Thus the protoxide of potassium, commonly called potash, forms two combinations with sulphuric acid; in other words, forms two *sulphates*. The first shows itself neutral in the presence of coloured reagents, and hence it is termed *neutral sulphate of potassa*, or simply *sulphate of potassa*. The second, on the contrary, exercises a powerful acid reaction on these reagents, the same quantity of potassa containing twice the quantity of sulphuric acid. To this is given the name of *bisulphate of potassa*, which at once indicates the relation it bears to the neutral sulphate.

Sometimes the acid and the base form two combinations in which the quantities of acid, combined with the same quantity of the base, are as 2 to 3; this happens in the case of carbonic acid and soda. The first combination is termed *neutral carbonate of soda*, or simply *carbonate of soda*, the second *sesqui-carbonate of soda*. There are also salts in which the quantity of acid is less than in the neutral salt, these are called *subsalts*. Thus, protoxide of iron and sesquioxide of iron form with sulphuric acid neutral sulphates, and basic sulphates, or subsalts, which are termed *subsulphates of protoxide*, or *sesquioxide of iron*. Two salts may also combine and form more complex compounds, to which the name of double salts is given.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 20*th September*, 1859.

In speaking of M. Nièpce's experiments with oxalic acid and nitrate of uranium, I mentioned, in my last letter, a small apparatus which serves to demonstrate the decomposition of oxalic acid in presence of the abovenamed salt, and when exposed to the sun-light. In this experiment, oxide of carbon is formed, so that the decomposition is complete. M. Nièpce has since invented a second instrument, which we may term a *solar pile*. It is thus constructed:—A piece of zinc and a piece of copper are fixed together by means of a slip of cork, in such a manner as to remain about a quarter of an inch apart. The whole is plunged into a glass vessel containing a saturated solution of oxalic acid (the excess of acid remaining at the bottom of the vessel), to which a certain quantity of nitrate of uranium is added. When this apparatus is exposed to the sun, a chemical action is immediately set up, and a galvanic current established. Copper wires having been joined to the zinc and copper plates, and connected with a galvanometer, the presence of the electric current is easily attested by its action upon the magnetic needle. I have no doubt that if a sufficient number of these solar elements were put in connection, a current of considerable intensity could be produced.

Dr. Phipson has repeated his experiment by which an organic colour is produced by the action of light upon starch mixed with a solution of nitrate of uranium. The time required for the production of this colour is from 8 to 10 days at least. In some kinds of glass the starch remains white for more than three weeks, whilst in others the purple colour is perceived in 7 or 8 days. In the white glass flasks manufactured at Paris (*fioles à medicine*), the experiment never fails. A certain quantity of starch is introduced, a weak solution of nitrate of uranium is then poured in, the whole is well shaken together, and the starch allowed to deposit. The flask is then placed upon a shelf near a window, and left perfectly quiet for a week or ten days; at the expiration of that time the starch on that side of the flask which is turned towards the light, is found to have acquired a purple tint. By shaking up the contents anew, again exposing the flask to the light, and continuing the experiment for 5 or 6 weeks, M. Phipson has been able to colour a considerable quantity of starch of a purple colour. The salt in solution does not appear to have undergone any change whatever.

At the last meeting of the Paris Academy of Sciences, M. Faye read a letter from M. Leverrier, director of the Observatory, in which the results of the observations of the latter *savant* upon the planet Mercury were condensed. It appears that the theory of Mercury and that of the Sun do not exactly coincide; M. Leverrier has shown, in fact, that 38 seconds must be added to the perihelic movement of Mercury, in order that the 21 observations which we possess of the passage of this planet before the sun's disc, may remain in harmony one with the other.

To explain this anomaly, M. Leverrier is inclined to admit the presence of an unknown planet rotating between Mercury and the Sun, or that of a quantity of asteroids, whose united action upon Mercury would be equal to that of a planet of its own bulk.

M. Babinet reminds us that, as early as 1772, an astronomer, named Lemonnier, observed a quantity of small, opaque bodies, passing before the solar disc. The passage continued for some minutes, and the chain of corpuscules had a diameter of two seconds.

M. Faye remarked, that one of the most important observations that could be made in order to discover this supposed planet, or a mass of asteroïds circulating between the Sun and the planet Mercury, would consist *in photographing every day*—as Sir John Herschel recommended some years ago—*the solar disc*. It will also be well to pay particular attention to this subject during the eclipse of the sun, which will take place on the 18th July of next year.

Dr. Berigny, of Versailles, has forwarded to me some ozone observations made during the splendid aurora borealis, of which I spoke in a preceding letter. It appears from these observations that, during the aurora borealis, a maximum of ozone occurred in the air. This is very striking when data. obtained during the week which preceded the aurora, and the week that followed it, are compared with those obtained on the nights of the 29th and 30th of August.

M. Buignet has published an abstract of an interesting memoir on strawberries. He has submitted to chemical examination a considerable number of species and varieties of this delicious fruit, namely, the wild strawberry (*Fragaria vesca*, L.); the Alpine strawberry (*Fragaria vesca, semper florens*); the strawberry of Bergamon (*Fragaria bifera*, Duchesne); the Chili strawberry (*F. Collina*, Ehrahrdt); the Caperon strawberry (*F. eleatior*, Ehr.); the strawberry of Virginia (*F. Virginiana*, Duchesne); and of Chili (*F. Chiloensis*, L.); together with some varieties of these, amongst which may be named the Princess Royal, and the Elton strawberry.

The analytical investigations comprised:—1st, The proportion of water; 2nd, the nature and the proportion of free acid; 3rd, nature and proportion of the different sugars; 4th, nature and quantity of the fatty matter; 5th, quantity of nitrogenous principle in the soluble and insoluble portions of the strawberry; 6th, quantity of insoluble matter, including the non-nitrogenous principles of the parenchyma; 7th, essays on the proportion of pectine, the odoriferous principle and the colouring matter; 8th, the nature and quantity of mineral salts.

The acid which exists free in strawberries is *malic acid*; its proportion varies, according to the particular species of strawberry examined, from 0·50 to 1·00 *per cent.* The author finds three species of sugar contained in the strawberry, namely, *cane sugar*, *grape sugar*, and *liquid sugar*. The presence of cane sugar in an acid fruit is rather a remarkable fact, as free acids transform it easily into grape sugar; but M. Buignet asserts that this fact is not confined to strawberries, and that he has found cane sugar in many other fruits. The mean total proportion of sugar varies from 6 to 12 per cent. of the weight of the strawberries; and when this proportion is compared to that of the other elements contained in this fruit, it is found that of all the fruits which have been analysed up to the present time the strawberry gives the most sugar. The grape alone approaches the strawberry in this respect. The phenomenon of cane sugar existing in the strawberry, side by side with malic acid, is explained by the fact that this cane sugar is found to be contained in cells or vessels which are quite separate from those in which the malic acid is found. The more water the strawberry contains, the quicker the malic acid and cane sugar come into contact by endosemose; the latter is then speedily transformed into grape sugar, and liquid sugar. This transformation takes place quickly in the expressed juice of the strawberry. It appears, therefore, that cane sugar is formed first of all in this fruit, and that it is gradually transformed during the growth of the strawberry into the other less sweet varieties of sugar by the influence of malic acid.

The Princess Royal and Elton varieties of strawberry, which are very common, are remarkable for the large percentage of water and acid, and the small proportion of sugar.

The wild strawberry and the Alpine strawberry are characterised by the great quantity of seeds which adhere to their surfaces, and render them rich in insoluble matter. They give far more sugar than the preceding varieties.

Finally, the *Fragaria eleatior*, *F. Collina*, and *F. bifera*, contain little acid and much sugar. A considerable proportion of this sugar (the $\frac{1}{3}$ or even the $\frac{1}{2}$) is contained in the fruit as cane sugar; and these species are certainly the best and most agreeable.

At Lyons, it has been found that a slight quantity of hydrochloric acid has a very beneficial effect in watering streets which are macadamised, and entirely prevents the formation of dust. Even in the hottest part of the day, and on a hard, gravelly soil, the wind raises no dust, and the ground remains slightly moist for a long time. The Town Council of Lyons, being pleased with the experiments, have ordered the Place Bellecour to be watered in like manner.

The rice plant, which is at present cultivated in Europe, only flourishes, as is well known, on marshy ground, and the rice plantations are extremely unhealthy localities; the poor peasants who are obliged to attend to them suffer frequently from fever. This state of things is about to change. I am glad to learn that the *Société d'Acclimatation* of Paris has received lately from China a new species of rice, which can be sown and cultivated exactly in the same manner as wheat, barley, or oats, that is, on dry ground, whence this new variety has been termed *dry rice*. Its introduction into Europe will be a great benefit to humanity, and the French will endeavour to propagate its cultivation by every possible means.

The French papers announce that the Russian Government are again discussing the question of a canal between the Black Sea and the Caspian. It appears essential to commerce that the Caspian Sea, which is in direct communication with the Baltic by means of river branches and canals, should also be put in connection with the Black Sea and the Mediterranean.

A subterraneous canal exists, or is supposed to exist, between the Black Sea and the Caspian. I remember to have read, or to have heard somewhere, that if a wine-cask is left floating upon the Caspian Sea it is found some time afterwards swimming upon the waters of the Black Sea.

THE ISLE OF WIGHT FROM A PHOTOGRAPHIC POINT OF VIEW.*

When we returned to Newport, after this visit to Appuldurcombe, we thought we had only one more excursion to make from it before quitting it finally; but, on questioning the landlady, we heard of a very curious old church at a village called Shalfleet, or Chalfleet (I am not certain of the orthography), and this we resolved to visit the next day. We found it a curious old building, of no great architectural pretension, but possessing some singular characteristics which make it far more interesting for photographers than many a church of more distinguished appearance. I cannot describe it further than by saying that it is different to any church I ever saw, and I have seen a considerable number. On leaving this place, it being still early, we stopped at Calborne, an old-world place, which showed fewer signs of extension than most other places in the island. There was one thing we could not help noticing, both here and in other parts of the island, which was the superior appearance of the cottages inhabited by the labouring population over the generality of those we had met with in various parts of England—at least, as regarded their external appearance, and, as far as we had opportunities of judging, of their internal arrangements also. The next day we left Newport for good, with the intention of taking photographs of the

* Concluded from vol. iii. p. 23.

two places which, perhaps, are more generally attractive to Isle of Wight visitors than any other places in the island. The places I allude to are Arreton and Brading churches. The neighbourhood of the latter furnishes as many beautiful views as any photographer need desire, and one in particular which was different to any I had previously seen. At some little distance from Brading church is the head of Brading Haven. It is a broad, flat piece of land, which at low water is a mudbed, but is covered by the sea as the tide gradually rises, and presents the appearance of a large and beautiful lake. This was once, according to tradition, solid ground, and supported a castle, the proprietor of which supported himself by robbing his neighbours, but principally by deluding passing vessels into the harbour, of which he took violent possession. He quarrelled with his son, turned him out of doors, and he is supposed to have taken service in a foreign army and died abroad, and the whole place eventually went to ruin. Many generations afterwards, a descendant of the son came from over the sea, and endeavoured to recover the treasure sunk in the well. He collected the twelve white oxen, which tradition said was necessary to effect this; but just as he was about to make the attempt one of the oxen died, and, in spite of warning, he filled its place with a coloured one. The oxen dragged away at the ropes, and the box was at the very brink of the well, and the man in the very act of assisting its exit, when peals of laughter filled the air, the rope attached to the coloured ox broke, and the treasure fell to the bottom of the well, which immediately began to overflow, and speedily covered the whole valley. How much truth there may be mixed up in this tale it would be difficult to say, but it is certain that Sir Hugh Myddelton received his title in consideration of having, in addition to bringing the New River to London, built a dyke with a view to keeping out the sea from this haven. This dyke lasted for a time, but gradually the water forced its way through, first in one place and then in another, until at last the whole thing gave way, and the sea resumed possession. The village of Brading is a miserable-looking place in reality, but it makes a very good picture. I took a stereoscopic negative of a part of it where the street widens out, and among the pictures I propose to send you, you will perceive this, the most remarkable thing in it being the massive iron ring let into the ground, which ring was placed there in the good old times for the purpose of attaching tho bull to it when baiting him. This has long been disused; but there is another relic of antiquity which is still occasionally used in the baiting of drunken and riotous individuals, viz., the stocks. I was assured that during the time that the fair is held it is very common to see a couple of individuals, guilty of drunkenness aud disorderly conduct, thus compelled to give leg bail; they being liberated without further punishment when the constable considers they had been imprisoned long enough. In spite of all that has been said on the subject of the barbarity of using this ancient instrument of punishment, it may very well be questioned whether it is not on the whole a more satisfactory method of punishing such delinquencies than sending a man to prison, and throwing the burden of supporting his family on the ratepayers during his incarceration. They are placed under the very wall of the church, but on the side where one cannot include them in the picture of that building. The view I took of the church included a portion of the churchyard, where lie the remains of Mrs. Ann Berry, on whose tombstone is the well-known epitaph beginning, "Forgive, blest shade, the tributary tear." Most ladies who visit the island come to this place to look on the spot where Leigh Richmond's heroine lies buried. The print from my negative of the church is hardly equal to some I saw in the island, which I think were taken by a Mr. Adams, a photographer resident there. From Brading I returned to Sandown, where I spent an hour in taking stereoscopic negatives of the fort from three different points of view. This fort makes rather a pretty little picture, but its use must be very small under any circumstances, I should imagine. It was not until a day or two afterwards that I made my trip to Arreton, which was in my way from Newport to Brading, but I had a friend with me who wished to visit the latter place, and then to catch the coach as it passed through on its way to Ryde, so that I could not take it in its proper order. Of course a trip to Arreton is not obligatory on the wandering photographer, but I would advise him not to miss it, if he wishes to stand well in the estimation of his female relatives. I was assured that ladies have visited this church, and the cottage which "the Dairyman's Daughter" occupied, who had come all the way from America for the express purpose; and I doubt whether any lady ever visited the island without making the pilgrimage to the spot where she lies buried. The inscription on the stone is quite distinct, and cannot be read, even by a man, without a saddening emotion. The exterior of the church is very old looking, and its size and appearance makes it very well worth the expenditure of a plate. The interior is filled with the wretched-looking unpainted wooden boxes which they call pews, and has nothing remarkable about it. There is, however, a three-volume edition of Fox's Martyrology of very old date, filled with illustrations after the manner of the period, the faces of the courageous men undergoing ignition expressing utter unconsciousness of what was going on at their lower extremities. This edition is, I think, a rare one, and it seems almost a pity that it should be placed where every person who enters the church can handle it.

With my visit to Arreton I shall bring my communications to you on the subject of my holiday in the Isle of Wight to a close; and with thanks for the favour you have done me in publishing them,—I am, yours &c., IOTA.

Miscellaneous.

THE STEREOSCOPE.—How little is this wonderful instrument understood and appreciated! The thousands who purchase it do so simply for the moments of pleasure it may afford—as a mere toy. Yet it is more than this: it is one of the most powerful instruments for investigating the past and present ever given to man to study. The past, in the contemplation of the vast piles of ruins and deserted cities of the ancients, which it places before you. The present, by the living scenes of to-day. In your parlour you can, by it, study every stone, its very fashion, size, and position, as hewn and placed by the workmen of every age—trace the progress of architectural art and sculpture, view the wonderful cities, living and decayed, of every country and period, or revel in the beauties of the primeval forest, the graceful valley, or the beautiful and sublime waterfall. The student in ancient history has, in the stereoscope and its pictures, a means of knowledge unsurpassed by even a visit to the lands of which we read. And to what great uses cannot this simple little instrument be devoted, were it properly understood and appreciated? Besides giving us the most intensely natural embodiment of scenes all around us, near and far distant, what a wonderful assistance would it be in the lecture room of the anatomist, or the closet of the medical student—what a ready help in the transition of information in architectural design, or construction! With this instrument you have before your eye, not merely a picture, but the object itself, in its length breadth, and height—every stem can be counted, every line traced, each marking of the hammer or chisel is prominently visible. In the medical college they can be made to take the place, in a great measure, of the dissecting room; every vein, muscle, and nerve can be reproduced to the eye in all the roundness and relief of the natural object. How many vexatious cases might thus, also, be preserved for future investigation long after the poor diseased body has crumbled into dust. The stereoscopo was not given to us as a toy, but as a powerful source of knowledge and investigation, and as such it should be employed.

HEATING POWER OF THE SUN.—All moving power has its origin in the rays of the sun. While Stephenson's iron tubular railway bridge over the Menai Straits, 400 feet long, bends but half an inch under the heaviest pressure of a train, it will bend

up an inch and a half from its usual horizontal line when the sun shines on it for some hours. The Bunker-hill monument, near Boston, United States, is higher in the evening than in the morning of a sunny day; the little sunbeams enter the pores of the stone like so many wedges, lifting it up. In winter the earth is nearer the sun, by about $\frac{1}{30}$th, than in summer; but the rays strike the northern hemisphere more obliquely in winter than the other half year. M. Pouillet has estimated, with singular ingenuity, from a series of observations made by himself, that the whole quantity of heat which the earth receives annually from the sun, is such as would be sufficient to melt a stratum of ice covering the entire globe forty feet deep. By the action of the sun's rays upon the earth, vegetables, animals, and man are, in their turn, supported; the rays become, likewise, as it were, a store of heat, and "the sources of those great deposits of dynamical energy which are laid up for human use in our coal strata" (Herschel). A remarkable instance of the power of the sun's rays is recorded at Stonehouse Point, Devon, in the year 1828. To lay the foundation of a sea wall, the workmen had to descend in a diving bell, which was fitted with convex glasses in the upper part, by which, on several occasions in clear weather, the sun's rays were so concentrated as to burn the labourers' clothes when opposed to the focal point, and this when the bell was twenty-five feet under the water.—*Curiosities of Science.*

Photographic Notes and Queries.

REDUCTION OF SILVER RESIDUES.

SIR,—If you think the following method of recovering silver from old filters, cuttings of prints, &c., sufficiently interesting to your readers, you are at liberty to publish it.

I had occasion the other day to empty my box of this kind of rubbish; and, to place them in as small a compass as possible, I set a clay crucible on the fire, which, when red hot, I began to fill with the aforesaid rubbish; and, being anxious to get the job done, I crammed the crucible too full, so that complete combustion could not take place. I therefore removed it out of the house to stir up the contents, when I found a large *portion only charred;* and, not wishing to create a *dust* in the house, I thought I would try the effect of a little finely-powdered *dry* saltpetre, and threw in a piece as large as a walnut; this made what you may term a "flare-up;" the flame looked very pretty, and this so pleased me, I must, child-like, try it again. Well, I then let it stand a few seconds to look at my work, when I perceived glittering in the sunlight a quantity of small beads of silver. I therefore went on throwing in the nitre and making a tremendous blaze and smoke until it ceased. The nitre being in a well-fused state at the bottom of the crucible, when suffciently cool I began to pump on the mass to dissolve it (instead of breaking the pot), thinking I might find a few grains of silver; judge of my surprise to find very nearly two ounces of the precious metal pure. I ought to say that, previous to toning the prints, I wash out all the free nitrate and precipitate in the form of chloride. I keep a little solution of salt in some Winchester quarts, and collect the chloride in these.

I suppose this silver will contain a small quantity of gold. J. S. OVERTON.

ACTION OF GUTTA PERCHA ON THE BATH.—MARKING AND DRILLING GLASS.

SIR,—In a recent number of the "NEWS" was an article on action of acid on gutta percha. I have now for two years used a gutta percha bath, and also kept the bath solution in a gutta percha bottle, and never had any ill effects until the last two months, when I have experienced the same faults as mentioned by your correspondent "A. Watt." Thinking it might be due to some alkaline reaction I have always put to the bath acetate of soda made thus:—Dis. water, one drachm; common washing soda, five grains; acetic acid, drop by drop, until effervescence ceases—the acid should be slightly in excess; this, put into the bath 3 or 4 drops at a time, has always made it work well.

I have for some time been in the habit of marking all my glass vessels, dishes, &c.—as, D. for develop—so as to know them. This is easily done with a file ground to a point, which will then readily mark on glass by keeping the point wet with spirits of turpentine; a common steel drill, such as used for iron work, will drill glass quite easily if wetted with the turpentine. I have taken many broken stoppers out by this means. W. L.

THE MICROSCOPE.

SIR,—A good book upon the microscope is much wanted, at a moderate cost. Would you allow me to suggest, through your valuable jonrual, to the proprietors of such works, that they should give us a new and enlarged edition, embodying the enlarged drawings from photographs as originally contemplated, and to which the following extract, from the 1854 edition of a popular work on this subject, refers. Such a work would, I am satisfied, be eagerly sought after, and well repay the cost of getting up. Nearly every photographer has (or should have) a microscope, which will, I hope, be a sufficient inducement to you to publish this letter.

I. W. W.

"When this book was first proposed, it was thought that if the object, so beautifully exhibited under the microscope, could be drawn by light on the page of the book, or on the wood block, so that the engraver might work directly from the drawing thus made, truthfulness would be insured, and we should present to the reader a valuable record of microscopic research never before seen or attempted. But in this we were doomed to disappointment, by the existence of a patent, which presented obstacles too great to be surmounted at that time; and the idea was abandoned, with the exception of a few drawings then prepared, and now ready to hand: the patent restrictions having been since removed, we have embodied them in our pages," &c., &c.

CONVERTING POSITIVES INTO NEGATIVES.

SIR,—The plan of converting positives into negatives, recommended by Mr. Fowler (vol. ii. p. 299) is very excellent in some respects, and was the one we followed for some time, but unless you run a line of varnish with a pencil all round the edges of the plate after drying it and before strengthening it, you are *almost sure* to have the film wash off, after having got a first-rate negative, to your great mortification and disappointment. We found it better, whilst the plate was still wet, to go through the whole process, precisely as Mr. Fowler has given it (except the drying). Still, we have found much better results to be obtained by exposing and developing as for a positive; with the ordinary sulphate of iron developer and without dissolving out the iodide, proceed to strengthen with pyrogallic developer until the required density is obtained. In this manner you have the rapidity of the positive process without the great danger of losing the film, which is occasioned by the action of the cyanide previous to strengthening. When the subject will admit of it, a little more time may be given than for a positive; but in the case of children and moving objects, with a little care instantaneous pictures may easily be got, and a less exposure is always required than if using the pyrogallic developer. H. & J. WALTER.

538, *New Oxford Street, W.C.*

MAJOR FITZMAURICE'S LIGHT.

SIR,—For nearly two years past the superior qualities, cheapness, and what not of the above light have been puffed forth in the press and before the world, and each new notice was said to be only preliminary to a company carrying out a most wonderful discovery by supplying

lamps and light at a cheap rate. But, alas! in this distant part of her Majesty's dominions the light has not appeared, and I fear never will—at least, to benefit photographers.

True, some months ago a Mr. Cochran, of this city, informed us through your journal that he was likely to get a copy of a prospectus from the Major; and now, at last, no doubt the light would appear, and photographers would get their new lamp and new light directly; but even this promise of a prospectus has vanished, and so hope has fled. Can you, Mr. Editor, Mr. Cochran, or even Major Fitzmauriee, put the Scottist photographers in posession of some real facts showing how they may get possession of this wonderful light and lamp, before the year closes? If so, in truth let us have it, or let it be admitted it is an *ignis fatuus*.

Glasgow. DOUBTFUL.

STAINS IN THE FOTHERGILL PROCESS.

SIR,—I can confirm your correspondent "G. M.'s" account of the stains in "Fothergill" plates, and though, like him, I have tried all suggested methods of washing, and many of my own invention, I cannot get rid of them. In despair I have given up the process, and find more satisfaction in working the collodio-albumen. With this process, though more tedious in preparation, I rarely fail in getting a good picture.

But, on account of its simplicity and quickness of preparation, Fothergill's ought not to be lost sight of. Two of your correspondents, "R. A. W.," in a recent number, and a gentleman who made a tour of the English lakes, with 40 plates, some time ago, are evidently working it extensively, and I should, therefore, conclude, successfully. Will they favour your readers with their details of preparation? If they tell us how to get stainless plates, they will deserve the warmest thanks of the workers of dry processes. G. R.

ANSWERS TO MINOR QUERIES.

SUITABILITY OF COLLODION FOR DRY PURPOSES.—Dr. Hill Norris, one of our most careful investigators in this branch of photography, has given the following directions for at once ascertaining whether any given sample of collodion is suitable for being employed for preparing plates by any of the numerous dry processes:—After coating the plate as usual, immerse it in the silver bath, and allow it to remain there for the full time; upon removing it, pass the finger across the plate for a little distance, pushing the film on before it. If it be now possible to draw the film back, or partially back, as a kind of skin, such collodion is quite unsuitable; but if the film in advance of the finger is in a powdery state, and cannot again be spread out, the collodion will be highly adapted to dry purposes, as its porosity, or the divided state of its molecules, admits of the perfect penetration of the solution of gelatine, albumen, or other substance, affording an obstacle to the condensation of the film on drying. Another method of distinguishing between the two kinds of collodion—powdery and contractile—is to mix them with an excess of water. If the pyroxyline be thrown down as a light, pulpy mass, swimming on the surface, the film produced by such a collodion will be of a contractile character, and unsuitable for the preparation of dry plates; whilst, if the pyroxyline be precipitated as a finely-divided powder, and the supernatant liquid does not become clear for some hours, the collodion will give a film of the powdery character so desirable for dry purposes.

MARKING THE RIGHT SIDE OF PAPER.—Most photographers are aware that there is a right and a wrong side to a sheet of paper, and one of the first operations to be performed is to make a slight pencil mark on that side of the photographic paper which is to receive the sensitive coating. If a sheet of Canson's paper be examined in a good light, one of the sides will be found to present a finely reticulated appearance, similar to linen, while the other will be perfectly smooth; this latter is the one that should be marked. Another plan is, to place the pile of paper on a table near a window, and examine it at a distance of a few feet; one of its sides will be seen to be marked with parallel bands running across it, alternately light and dark, and about one inch wide; the *reverse* side will be the one which is to receive the picture. Fifty or a hundred sheets may be marked at once, by holding a pile of them firmly by one end, and then bending the packet round, until the loose ends separate one from another like a fan. If all the sheets have been previously placed in the same direction, it is only necessary to ascertain that the smooth side of one of them is uppermost, and then draw a pencil once or twice along the exposed edges.

TO CORRESPONDENTS.

THE STEREOSCOPIC EXCHANGE CLUB.—A great many letters and specimens having been received just too late for insertion in the last list, we propose to publish a supplementary list in an early number. We would suggest to our correspondents the advisability of not delaying their communications on this occasion till the last moment.

TULLOW.—1. The use of the openings in the upper part of the camera is to allow of the focussing screen and plate holders being placed at different distances from the lens, so as to be able to use lenses of any focal length. 2. An expanding camera, with flexible sides like a concertina, is, we think, the most generally useful for tourists. 3. Experiment alone can decide this. 4. An achromatic meniscus is usually employed for views; a plain meniscus lens will not give so good a picture, even when correction is made for the difference between the chemical and visual foci. 5. A good, well-seasoned, yellow pine will do very well for constructing a camera with.

W. E. G.—Several plans for a panoramic camera have been suggested at different times; but none have, *prima facie*, seemed so likely to succeed as the one mentioned some months back by our Paris correspondent, as having been made by M. Porro for the use of the French government. The whole thing, however, must be considered as almost untrodden ground, for we are not aware of any *pictures* having been taken by *any* panoramic apparatus yet in existence.

GEO.—1. Some such arrangement as the copying camera, described by Mr Sang, in our last volume, will be required. 2. O's calotype process will do very well for your purpose, if you expose long enough. 3. You should not have added ammonia to your bath, *thinking* it was acid: you should first have made sure it was acid, and then treated it with carbonate of soda. We fear the bath is now spoiled.

JAMES C.—Sell your large lump of metallic silver, and purchase good nitrate of silver with the proceeds. That will be far more economical than attempting, with your acknowledged ingorance of chemistry, to convert it directly into nitrate of silver. You will obtain 5s 2d., or thereabouts, per ounce, according to its purity, for your lump of silver at any respectable bullion dealer or refiner, of which there are many in London and most large towns.

D.—We gave our correspondent all the information in our power respecting "instantaneous" photography. He may be incredulous, but there really is no conjuring in the matter; and any amateur, with good chemicals, lens, and light, would be competent to take as rapid pictures as we could ourselves.

A. Z.—We decidedly give preference to the process of washing the print thoroughly before fixing or toning. There is, however, no *insuperable* objection to the other plan, as many excellent photographers are in the habit of fixing and toning all their pictures in one bath without any previous washing.

W. L. C.—Diminishing the size of the stop in front of a lens, causes the image to be sharper. If the image is sharp in the centre and not at the edges, it may be remedied by diminishing the size of the diaphragm, or by increasing the distance between the lens and diaphragm, until the point of best action is reached.

F. R. M.—Mr. De la Rue has succeeded in obtaining very excellent *photograms* (as he terms them) of several of the fixed stars, besides Jupiter, Saturn, the Moon, &c. We believe other astronomers have also been successful in stellar photography; especially the late Mr. Bond, in America, and Père Secchi, at Rome.

AMATEUR.—We have heard of a similar occurrence before, when using Norris's process, but are quite unable to account for it. You had better try another more certain process, such as the Fothergill, or collodio-albumen process.

S. W.—The print received is a very excellent specimen of the vigour to be obtained by Mr. Overton's process of converting positives into negatives. We wish S. W. could have pointed out what he considers to be the cause of his films not separating from the glass.

QUERIST.—A solution of peroxalate of iron may be washed over a sheet of paper which it will make sensitive to the light in the same way as the solution of the peroxalate is. It may be developed by means of a solution of nitrate of silver or of chloride of gold.

A GREEN ONE.—See notice at the commencement. We shall be glad to assist our correspondent to the best of our ability; but at present we cannot quite understand what he wants to know. Will he be a little more explicit?

T. HOLLIS.—Additions to the former list will shortly be published. We shall be glad to see your views of Ramsgate, &c. The six stereograms you refer to have not yet arrived.

T. B. LEACH.—In our next list. The specimen received is very good. Add a little alcohol to your developing solution; that will remedy the greasiness complained of.

A. M.—We are much obliged for the information, but do not think that it would prove of service to our correspondents, as it would be frequently found to injure the pictures.

A. B. C.—Any almanack or pocket book will tell you how many drachms there are in an ounce.

A. G.—Both hyposulphite and carbonate of soda will keep any length of time in solution, in a well-stoppered bottle.

NUGÆ SERIA DUCUNT.—The price is 1s. each part. We do not know who are the London publishers, but you can obtain it through any bookseller.

A JERSEY AMATEUR.—We will consider the proposed suggestions.

J. THOMAS.—In our next list.

Communications declined with thanks.—F. R. C.—Ollos.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—Peter Q.—Stromboli.—R. W. O.

IN TYPE:—M. Léon Foucault.—M. Van Monkhoven.—B. M. Brackenridge.—M. A. Root.—J. N.—G. H. W.—William Boyer.—T. P. Bath.—N. Ennel.—D.—R. J. Fowler.—F. D——m.—W. R. Hurst.—A. Goodfellow.—E. S.—Aliquis.

Cases for Binding Volume II. have been prepared, price 1s. 6d. each. Subscribers may have their copies bound by the Publishers, in the usual manner, price 2s., including the cloth case.

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 56.—*September* 30, 1859.

MEETING OF THE BRITISH ASSOCIATION.

SECOND NOTICE.

The meeting of the British Association, just concluded, has been the most numerously attended of any held since its foundation; so strong, indeed, was the desire to be present, that, considering the extent of the accommodation, it was found necessary to limit the number of associates admitted. This unusually numerous attendance was no doubt partly owing to the fact of the President being the Prince Consort, but there is no doubt that the attendance would have been good even if this had not been the case—the popularity of the Association increasing as it does year by year. The exhibitions connected with the meeting possess more than the ordinary attractions; the archæological, for example, is especially rich in those things which carry back the mind to the days of our ancestors. It contains abundant specimens of stone arrow-heads, spear-heads, hammers, flint knives, stone hatchets, pateras, and a number of clay pipes, commonly termed elf-pipes, which are popularly considered to have been used by the elves in their nocturnal revels, and which those more learned assert to have been used by the ancient Picts, for smoking their vile componnds of coltsfoot, hemp, and moss; and whether this theory be well-grounded or not, we do not think it is set aside by the mere fact that one of them was picked up, which smelled strongly of tobacco, inasmuch as it may have very frequently occurred that a ploughman would pick up one of these pipes, use it, and then throw it away again. *Apropos* of these old pipes, it is rather remarkable that they should be found in such quantities, and in such situations as they are. At the *Times* office, for example, which stands on a site whereon a convent and a playhouse formerly stood, where Shakespeare, Burbage, and others performed before select audiences, a number of curiously-shaped pipes were found about ten feet below the surface in digging the foundations, which, probably, were used by the frequenters of the theatre during the performance, and possibly some of them were used by the great genius himself; and it is by no means a far-fetched supposition that the renowned navigator, Sir Walter Raleigh, contributed a portion of them.

The exhibition likewise exhibits specimens of "stone horse-collars," as they are called. They are large enough to have been used for such a purpose, but the material is so little adapted for it that their real use is unknown. Numerous specimens of gold ornaments are exhibited, and a selection of bronzes, consisting of swords, armlets, and battle-axes, mostly of the peculiar snakelike form which was affected by the northern European races; also specimens of the weapons left behind by invading races. Those who are curious in the matter of old ornaments would find much to interest them: old Scandinavian brooches, beautifully wrought, and less beautiful but more numerous examples of early Highland art. There is one rich specimen which the public are permitted to view for the first time for many years; this is known as the Glenlyon brooch. It is of a circular form, made of silver, and richly jewelled, and has the names of the three kings of Cologne engraved upon it. All sorts of weapons of destruction are exhibited, from the flail and crossbow to the modern musket, many of them said to have belonged to old Scottish chiefs of note. Neither are antiquities wanting, which derive their principal interest from some particular circumstance. It is with a kind of horror and satisfaction that we look at the instruments of torture exhibited here—horror that such horrible implements as these should ever have been used upon human beings, many of whom were individuals who were not only innocent, but of whom mankind might be proud; and satisfaction at the thought that we live in an age when leniency is carried so far that it is not considered sufficient for a jury to convict a man of a murder to ensure his execution.

The collection of Jacobite relics is extensive: there are several portraits of Prince Charles and his father, others of Flora Macdonald, and sundry female Jacobites of celebrity. Letters from the Pretender and his unfortunate adherents; his pistols, a case of mathematical instruments, and the copper-plates from which his banknotes were printed; the nominal value of each note being 4d. and 6d., and the actual value of which might have been represented by an 0.

Of the collection of portraits we have merely space to observe that they are of considerable merit generally; and are otherwise of great interest, from the personages they represent.

The collection of autographs is rich in the signatures of men of mark in Scottish annals; in addition to which Mr. Murray sends the private note-book of Lord Byron; and the Misses Glennie a number of letters from Samuel Johnson, Boswell, Gray, Reynolds, Wilberforce, and Garrick.

In the section devoted to chemical science, various interesting papers have been read, which we can do little more than enumerate in this place, reserving those most interesting to our readers for more extended notice hereafter. A report was read by Professor Maskelyne, on The Chemical Character of the Photographic Image, showing the parts which the various chemicals play in the production of the photograph; a full abstract of which is given at p. 39. Beside this, two other papers, devoted especially to photography, were read: one by Dr. Gladstone, and another by Abbé Moigno, in which he referred, at considerable length, to some of M. Nièpce de St. Victor's experiments, and exhibited several specimens of photographs, by different processes, which he had brought from Paris; for which, and for his other important communications, he received the thanks and compliments of the President; the applause of those present testifying to their participation in the opinion of the learned professor. Among the papers which elicited this approval, was one on the subject of M. Issard's discovery of a new method of generating illuminating gas, by means of super-heated steam and any hydro-carbon. It is said that it can be sold at a much cheaper rate than that manufactured in the ordinary way from coal. The President read an elaborate paper on "A Systematical Representation of Oxides and Salts on a Common Type," illustrated by diagrams. Mr. F. Ransome read a paper on "Soluble Silicates," describing the nature of the process, and giving an account of some experiments made in the dockyard at Woolwich; from which it appears to result that his composition termed artificial stone—made by mixing a soluble silicate of potash with silicious sand and other materials, and subsequent burning in a kiln—is harder and more durable than most kinds of stone. A paper by Dr. MacVicar was read on the subject of his peculiar theory with respect to the organic elements and their relation to each other, illustrated by models of the forms and structures of the molecules of bodies. The paper showed a great amount of research and labour on the part of the reverend gentleman.

Dr. Wallace read an account of the experiments on the equivalent number of the element bromine, in which he employed the bromide of arsenic, a compound offering peculiar facilities for thorough purification by distillation and crystallisation, the result of these experiments being the number 79·74. He followed this paper with another on some proposed improvements in the manufacture of kelp, with a view to benefiting the poor people who manufacture it. He proposed that the seaweed should be placed under sheds for dessication, and afterwards charred at a low temperature into a loose ash, instead of being burnt as at present. By the adoption of this process, the loss of iodine would be prevented, as also the production of sulphur compounds which cause an enormous consumption of vitriol in decomposing them. On the conclusion of the discussion which followed the reading of this paper, Dr. Odling read a short paper on the subject of "Marsh's test for arsenic;" and after stating that this test depends on the production of arseniuretted hydrogen where arsenical substances are in presence of nascent hydrogen, he proceeded to show that numerous bodies, including the organic substance contained in ordinary vegetable tissue, animal tissue, salts of copper, and oxidising salts, prevented the formation of arseniuretted hydrogen, and thereby defeated the action of Marsh's test. As a method of separating the arsenic from these interfering substances, he recommended the process of distillation with muriatic acid, so that the arsenic in the form of trichloride of arsenic is isolated in a form suitable for testing.

A new process of etching glass in relief by hydrofluoric acid was described by Mr. Napier. A paper was likewise read by Dr. Odling on a subject in which everybody is interested: this was the process of Dr. Dauglish for making bread, which is so rapid that a sack of flour may be converted into loaves within an hour and a half. By this process the flour undergoes no modification from the production of carbonic acid, that being added to it by the gas being pumped from a gasometer into the glass cylinder containing the water used in mixing the dough; this mixture being accomplished under pressure. As a convenient substitute for this process in the case of small establishments, Mr. Trevelyan suggested the use of muriatic acid and carbonate of soda in certain proportions; upon which Dr. Daubeny remarked that there might be a possibility of the acid containing arsenic; and on Mr. Trevelyan remarking that it was the opinion of some that arsenic taken in small quantities was not injurious, he observed, as did also the President, that no faith should be put in the statement made by Mr. Johnson in his "Chemistry of Common Life" with respect to arsenic being taken in small doses by the Tyrolese women to improve their complexion, and that when taken constantly the system becomes used to it; that being the very reverse of the truth. In confirmation of this, Mr. Lieving remarked that he had been informed on excellent authority that Mr. Johnson had been hoaxed in this matter, the perpetrator of the hoax being unwilling to confess his shameful deception after his statement had been made public. The amount of evil that may have been caused by this mystification will never be known, because those who were weak enough to adopt its suggestion would not be likely to confess their weakness.

Mr. G. C. Foster read a report on the recent progress and present state of organic chemistry, prepared by Dr. Odling and himself, to which reference will be made on a future occasion.

Mr. Burnett exhibited some photographs toned with a solution of bichloride of platinum, the objections to the use of which he had attempted to remove to a certain extent by the addition of carbonate of soda.

The business of the Section was brought to a termination with the reading of a paper on some new cases of phosphoresence by heat, by Dr. Phipson, of Paris.

The Earl of Rosse delivered an interesting address on opening the Section under his presidency, that of mathematical and physical science, showing the wonderful advantages which we were now deriving from the vast amount of knowledge accumulated since men's minds had been devoted to the search after truth; and the ultimate importance, even to the mere utilitarian, of those researches, which he was in the habit of stigmatising as vain and leading to nothing.

Amongst the papers which have been read in this Section is one by Professor W. Thomson, "On the necessity for incessant recording and simultaneous observations in different localities to investigate atmospheric electricity." The reading of this paper was followed by some inquiries, on the part of the Prince Consort, with reference to the direction of the currents described in the paper; which Professor Thomson answered by referring to an apparatus he had constructed, which showed the direction and intensity of the stream of electricity. The importance of the subject to which the paper referred was testified to by Professor Faraday, and Dr. Robinson urged the Section to recommend a grant of money to be laid out at Kew in promoting these observations. The Astronomer Royal, in speaking of the paper, pointed out the great want of a self-registering apparatus, in connection with that which had been described.

The next paper read was on the subject of the Luminous Meteors which had fallen since the last meeting of the Association, especially in reference to those which fell on the 10th August last.

The Hon. Sec. to the Liverpool Compass Committee—Mr. Towson—read a paper on "The deviations of the Compass in Iron Ships." Admiral Fitzroy expressed himself in warm terms as to the value of the services of the Astronomer Royal in investigating the nature of the deviation of the compasses on board iron ships, and expressed an opinion that these had been so great that their practical value was greater than that of all his other eminent services combined. A long discussion followed, in which several eminent men took part; after which Professor Thomson read a communication from Mr. Fleming Jenkin, on "The Rapidity of Signalling through long Submarine Telegraphs."

Sir W. Hamilton read a paper "On an application of Quaternions to the Geometry of Fresnel's Wave Surface." This is a new system of calculation invented by Sir W. Hamilton, the value of which is to a certain extent proved. A paper was next read by Admiral Fitzroy, "On Aqueous Vapours and Atmospheric Waves." The Astronomer Royal made some remarks, the tendency of which were to show that the inquiries that had been made had only served to involve the science of meteorology in greater obscurity than ever.

Sir D. Brewster read a paper on "A New Species of Double Refraction," which may possibly be considered at length in a future number. Some specimens of glass, in different stages of decomposition, were shown in illustration of certain points dwelt upon, which had been lent by the Marquis Campana. On a subsequent occasion he read a paper on the particular subject of decomposed glass, in which he described the appearance which glass in an advanced stage of decomposition presented. Sometimes this decomposition takes place over the whole surface, leaving the centre in a sound state; at other times, it took place around a few points, forming hemispherical cups, which exhibit the black cross and the limits of polarised light.

Mr. Lindsay, of Dundee, read a paper on "A Method of transmitting Electric Effects across Water without the aid of Transverse Wires." He commenced these experiments more than twenty-five years ago, and has continued them at intervals ever since, varying them occasionally by using uninsulated wires. He more recently succeeded in sending a current across the Tay, where it is three-quarters of a mile wide. His method is to immerse two plates of metal on one side, and connect them by a wire passing through a coil to move a needle, and to have on the other side, and nearly opposite, a similar apparatus. Of the electricity generated, only a small portion goes across, which may be increased in different ways—by increasing the power of the battery; by increasing the surface of the immersed sheet; by increasing the coil that moves the receiving needle, or by increasing the lateral distance. Where the latter could be effected he

recommended its adoption, as a smaller battery would, in that case, answer the purpose. Experiments on this method of transmitting currents were made during the Exhibition in Hyde Park, which appear to have been successful as far as they went. The discussion on this subject was followed by the reading of a paper, by the Abbé Moigno, on "The Phonautograph, for Registering Simple and Compound Sounds," a detailed description of which was given in the last volume of the "Photographic News." Several other papers were read by the learned Abbé, and others which our space will not allow us to refer to in detail. The papers read by M. Claudet, on several subjects connected with photography, will be dealt with altogether in a future number. We must not, however, pass over without mention, the fact, that Sir D. Brewster exhibited a curious specimen of chalcedony, in the interior of which a landscape was depicted, which was stated to have been produced by the action of the nitrate of silver, insinuated into the chalcedony; it was also stated that, if this piece of mineral were put away in a dark room for about four hours, the picture would wholly disappear, but that it might be again rendered visible by exposing it to the action of the sun's rays for a few minutes. This specimen was examined with great interest, and is of old date. M. De la Rue read a highly interesting paper on "Celestial Photography," in which he described the process employed by him in obtaining photographs of the moon and certain of the planets; and accompanied his paper with some fine specimens of the photographs he had obtained.

The formal closing of the meeting of the Association was attended with the usual presentation of thanks to those who had been instrumental in making it pass off so successfully, especial mention being made of Mr. J. C. White and Professors Nicol and Fuller; nor were the local treasurers, Mr. Angus and Mr. Burnett, forgotten.

Professor Nicol, as one of the local secretaries, acknowledged the compliment, and, in doing so, referred to the anticipated difficulties in securing a successful meeting. He never doubted, however, that the best efforts of his fellow-citizens would be given, and the result had far exceeded his expectations. They, as secretaries, had had a good deal to do, but thanks were also due to those gentlemen and public bodies who had so kindly aided them.

Professor Fuller also acknowledged the vote of thanks.

Mr. Angus said, he had the honour, in the name of Mr. Burnett and for himself, as the local treasurers, to thank the Association for the vote which they had been pleased so cordially to pass in acknowledgment of their humble services—(applause).

Sir David Brewster then adjourned the meeting to Oxford in June next year.

Two or three conversaziones were held during the meeting, which were well attended, the visitors being liberally supplied with means of amusing themselves apart from the charms of conversation. Among sundry other things were numerous stereoscopes and microscopes; the former furnishing the staple of amusement at all similar meetings now. During the day occasional trains were run to places of interest in the vicinity; and on one occasion all the foreign visitors and the principal English ones were invited to a breakfast at Balmoral, which place was reached under circumstances of considerable difficulty—a part of the journey having to be performed in and on omnibuses, which were loaded. A heavy shower wetted the outsiders considerably, and it was perhaps fortunate for these unfortunates that an omnibus which carried about fifty of them stuck in the mud, so that they were compelled to warm themselves by a walk up the hill. A number of men belonging to different clans kept the ground at Balmoral, on which the Scottish games were performed for their amusement. These games rather astonished the distinguished foreigners present, whose only ideas of such amusements must have been derived from their recollection of the games of ancient Greece; unless, indeed, they had a more vivid recollection of those revived by M. Ferulus at the chateau of M. de la Roche-noire.

REPORT ON THE PRESENT STATE OF OUR KNOWLEDGE REGARDING THE PHOTOGRAPHIC IMAGE.

BY PROFESSOR MASKELYNE, J. D. LLEWELLYN, F.R.S., F. HARDWICH, AND E. HADOW, ESQRS.

In this report the authors confine themselves to the results obtained with salts of silver, and the question first considered is the chemical condition in which the silver remains when light had completed the decomposition of the chloride as far as it could. May the chlorine and silver be considered to be completely dissevered in the ultimate result, the gaseous element going away and the metal remaining mixed with, or rather encrusting, particles of unaltered chloride? The paper then proceeds to detail certain experiments with reference to the determination of this question, bearing in mind that in the photographic processes which employ chloride of silver, the substance is not used by itself, but always in conjunction with nitrate of silver, and also with organic substances, among which the paper and the size upon it are prominent. The writers considered that they were justified in drawing the following conclusions:—

1. That the action of light on chloride of silver is to reduce it, in so far as it is able to penetrate its substance, to the state of a sub-chloride.

2. That in the presence of nitrate of silver this deposit of sub-chloride is necessarily more plentiful; but that, in both cases, moisture being present, some part of the liberated chlorine passes into an oxide, which in the latter case prevents a portion of the chlorine set free from conducing to the formation of fresh sub-chloride. From this point they proceed to the discussion of the photographic image, in more complex, but, for the photographist, more available forms. And in doing so, they point out that the image varies in its character in different stages of the photographic process; the first result obtained by the light, even if it be the same in all stages of the solarisation, is not the result which is in many cases left after the fixing solution has performed its work, while this is again frequently succeeded by another variety of image, by the employment of the methods called toning. The results at which they conceived that photographic chemistry had now arrived in respect to the direct processes involving the use of silver salts may be thus stated:—

The materials employed perform various functions:—1. One of these is that of supporting the picture as a mechanical material or basis for holding the chemical bodies. Of the substances so employed, the tissue of the paper is one. Pyroxyline is spread on glass to afford another. The latter appears to be inert. The former, on the other hand, seems to aid in producing the chemical results. 2. The silver salts employed, whereof the chloride, for which other salts may be substituted each with a specific effect, appears to act by imparting sensitiveness. The nitrate, on the other hand, is present in excess, to keep up a constant succession of sensitive material, and so to give vigour and intensity to the image. 3. Gelatine, as a size, or albumen, as a glaze, and various other substitutes for these, but little linked together by any chemical analogy between them, co-operate by conferring rich tints and deep tones, while they impart to the image formed on them an immunity from the destroying action of the fixing process, and form a mechanical surface more or less impenetrable, which prevents the other sensitive compounds from sinking into the paper. With reference to photographs produced by development, the several causes which determine the deposit of the images, in their several states, appear to be these:—1. Materials forming the sensitive film. Pyroxyline in chemical purity has no tendency to form the darker image; albumen and the heterogeneous substances (including decomposed collodions), which the authors have had to yoke in the same class, have this tendency. In general, the tendency to produce the darker image is found to be in something like an inverse ratio, *cæteris paribus*, with the sensitiveness. The use of bromide of silver with iodide

imparts to a collodion film a tendency to deposit the metallic image, at the same time that the sensitiveness is much impaired, and a very powerful reducing agent is needed to develop it. With albumen this influence is not felt, for in this case bromide of silver is held to increase the opacity of the image. 2. The nature of the developing agent.—The substances used to develop the latent image, besides the free nitrate of silver invariably necessary, embrace also, without exception, one ingredient, the character and the purpose of which are to reduce the salts of silver. 3. The character of the light has also a remarkable influence in inducing a grey or a dark character on the developed image.

If the picture has been produced by an intense light, or by a lens of large aperture, or, as in the case of an exterior, as contrasted with an interior view of a building, or as on a dull, misty day, in contrast with a bright and sunny one, it will be found that, *cæteris paribus*, the tendency of the shorter action of the light is to allow the reduction of the silver in the metallic form. On the other hand, more intense light gives to the molecules of the sensitive film a contracting energy, which they exercise on the deposit, and which appears analogous to that of the light in the direct process, in its modifying the reduction and giving it the form of a production of an argentine compound; as though the iodine compound became in a certain sense phosphorescent to the chemical rays of the light, and operated upon the mixed silver salt and the reducing agent, as they float over it, in the manner that the direct light must be supposed to do.

OF THE INFLUENCE EXERCISED BY LIGHT ON DIVERS SUBSTANCES.

BY MM. NIEPCE DE ST. VICTOR AND L. CORVISART.

The following is the paper presented to the *Academie des Sciences* by the gentlemen above-mentioned, and referred to in our Paris correspondent's letter:—The title of the memoir is, "Of animal and vegetable fecula, in relation to the influence exercised upon it by solar light; of dextrine, cane sugar, and oxalic acid under the same aspect; of substances which destroy or increase this solar action."

The substance of the paper will be found in the following propositions:—

1. The solar light, by an action proper to itself, modifies and transforms certain amylaceous substances, and some of their derivatives.

2. The sole but prolonged action of the light converts pure and dissolved fecula to the condition of dextrine, and, more especially, of sugar. But, in the first place, the light intimately modifies the starch in its nature, and changes it into a new body, resembling inuline (such as it is found in the dahlia and colchicum), in so far as it is entirely insensible to iodine in a cold state, but which, nevertheless, differs from it, in so far as it does not reduce the salts of copper and silver in presence of ammonia; it does not deviate the plane of polarisation.

In a solution of fecula (1 part in 1,000 of water) this change may be effected after about six hours' insolation on a fine day in July or August, but it more frequently requires from twelve to fifteen hours to obtain the desired effect thoroughly. It may be exposed in the same place, for the same time, to the same temperature, without any change taking place in the starch, provided it is protected from the light; so much so, that a few drops of solution of iodine communicate a deep blue tint to the mixture, which, in the other experiment, remains colourless.

3. This converting action is impeded by the lactates—citrate of iron in solution in 100 parts of water—and entirely prevented by the perchloride of mercury. The ferro-potassic tartrate assists the conversion, whether in light or darkness, but, at least, one-third more in the light.

Nitrate of uranium, in the same proportion, powerfully assists the solar action, which becomes five, six, and even seven times more intense; it is both more rapid, and the quantity of starch converted is greater. The three kinds of conversion of starch, pointed out above, take place; in the first place, the iodine ceases to colour the cold solution, but there is no polarmetric deviation; then the sugar and a little dextrine appear.

The same amylaceous solutions, protected by obscurity, although exposed in the same place, remain unaltered.

4. The acids of the preceding salts, in weak solutions (in 200 parts of water)—that is to say, nitric and tartaric acids—impede the light from exercising its habitual converting action. Oxalic acid enjoys the property of accelerating and rendering the alteration of the starch more intense (as shown by the want of influence of iodine upon it) under the action of the light. Its comparative action is, on the contrary, *nil* in obscurity.

Nitrated soluble substances, albumen, pepsin, even pancreatin, did not appear to us to exercise a less influence in darkness than in light.

5. Whichever it may be, whether unique or only primordial—primitive or secondary—the cause of the changes we have described is light.

6. Dextrine is much more a product of art than a natural product. Dextrine, obtained by diastase, does not reduce Barreswill and Fehling's re-agent; undergoes no converting action under the solar light. None of the bodies we have examined appeared to us to develop this influence; nevertheless, the same bodies, without light, but with the assistance of heat, are suitable for profoundly modifying this same dextrine, so much does ordinary heat differ from solar light in its results on organic bodies.

7. Cane sugar does not undergo a converting action from the solar light; the substances, such as hydrochloric acid, nitric acid, which, as is well known, profoundly modify it, accomplish this just as well in darkness as in light.

The light, in presence of nitrate of uranium, does not act upon it otherwise than the same salt in obscurity.

8. The temperature of boiling point is requisite to decompose oxalic acid—one of the derivatives of starch—in presence of concentrated sulphuric acid; without concentrated sulphuric acid, a temperature of from 250 to 370 degrees is necessary to liberate the oxide of carbon.

This same oxalic acid, considerably diluted, in presence of nitrate of uranium (1 to 100) heated to boiling, or kept for forty hours at a temperature of 104°, does not liberate a single bubble of gas, if it is in a dark place. As soon as this solution is exposed to the light—even diffused, the temperature being even as low as 65° or 70°—action commences: a favourable insolation of one hour may furnish inflammable oxide of carbon gas in abundance.

A little apparatus, composed of a vase filled with some of this solution, and closed by a cork, pierced with a tube plunging to the bottom of the solution, is so sensitive, that it may serve to measure, almost instantaneously, the solar action; the gas, in proportion as it is liberated, presses on the liquid, which rises in the tube, and so much the more as the converting activity of the light is at the moment more intense.

9. According to the direct experiments we have mentioned animal fecula is converted into sugar more rapidly and more abundantly under the influence of light than in obscurity; but nitrate of uranium impedes and does not stimulate the solar influence on animal fecula.

10. Like vegetable fecula, animal fecula remains in the liver of frogs during the winter without becoming sugar; the greatest richness of their liver in sugar coincides exactly with the epoch of the ripening of fruits: towards the end of June, July, and August (according to researches of Professor Schiff, undertaken for other reasons than ours, but which furnish us with valuable information), glycogenous matter may be kept unchanged in the liver, like starch in cells; if the frogs are entirely secluded from the light, no sugar is produced.

11. It must, nevertheless, be borne in mind, whether it is that only a feeble light is required, or that the action of this is strengthened by the presence of certain salts or ferments,

that among most animals and man, the amylogenic, like the glycogenic functions, do not experience any intermission in winter.

12. The actions of light we have sketched are generally slow, and exercised on small quantities; we know, moreover, how long a time this daily feeble action of the light takes to bring grain and fruit to maturity, and yet how powerful it is altogether.

13. Therefore, if, without augmentation of light, certain substances on the one hand, double, triple, or sextuple the effects of the solar action, for example, in the formation of animal or vegetable sugar; if, on the other, without diminution of solar intensity, certain other bodies annihilate or prevent the consumption—for example, of starch under the solar action—we cannot conceal from ourselves that analytical studies, followed in this direction, may be exceedingly useful, as regards vegetable physiology as well as agriculture, and possibly also as regards medicine; it suffices to recall diabetes and the influence of insolation on scrofula. The intimate actions of nutrition are, in fact, very little known.

PHOTOGRAPHIC FAILURES — THEIR CAUSES AND REMEDY.*

BY ALEXANDER WATT.

6. *Fogging from light.*—For a long time I had been troubled in a very extraordinary manner. Almost every plate after I had developed it exhibited one or two oblique streaks proceeding from one corner of the plate; but occasionally the plates did not present this defect. From the nature of the streak I was led to attribute it to light entering the camera; this I carefully tested and proved that it was not the source of mischief. The dark room was next suspected, but although it was admitting light pretty freely in several places, I proved that the oblique streaks were not owing to this. At last, when nearly as "mad as a March hare," I discovered the following to be the cause, and as it is not unlikely to occur to any one, I deemed it prudent to "make a note of it." I was using a glass bath, which had been painted over with black japan varnish. The bath stood at a slight distance from the yellow glass of the dark room, and I discovered that there were several places on the bath where the varnish had been imperfectly coated: the light was passing *through the yellow glass, thence through the glass bath* direct upon the sensitised plate. I then covered the bath well, and no further mischief occurred. I should always recommend that the glass bath be covered with a jacket of gutta percha, or in some other way rendered impervious to light, as it is impossible to depend upon black varnish if it is merely painted over the bath.

Fogging from light may also occur from imperfections in the camera; for instance, I have frequently seen, when looking into a camera without the focussing glass, light entering between the movable tube which contains the front lens and that which is screwed into the flange, where the rack and pinion act; and this, unless the aperture be covered, will sometimes prove mischievous. It not unfrequently happens, also, that the front of the camera has become cracked whilst fixing on the flange, and although these defects are hidden by the workman with red putty, if the camera is left in the sun, the cracks will open and thus admit a considerable amount of light. To remedy this, I glued pieces of brown paper *inside* the camera. Whenever the instrument is suspected to admit light, it is better at once to sensitise a plate, expose it in the camera for a little while, and then pour on the developing agent; when, if the plate is at all foggy, the source of mischief must be traced and properly stopped.

Sometimes when the background is white, and the full aperture of the lens is employed, the light is reflected into the camera to such an extent, that fogging frequently occurs in the same way that it does when the lens is turned towards the sun. When this is the case, it is advisable to place a funnel made of brown paper or cardboard (blackened inside) over the lens, and, if possible, to place the background diagonally across the room, or the camera in an oblique direction, so that the light may not play directly upon the lens. Very good effects may be produced by placing the background in such a way that it does not come directly in front of the instrument. In fact, under most circumstances, I would prefer placing the camera at a considerable angle from the background, so as to throw one part of it quite out of focus, if not all.

In copying oil paintings, daguerreotypes, and any objects which reflect powerfully, it is advisable to place them in some position which will tend to check the reflection as much as possible. All objects in front of the picture, therefore, including the camera, may advantageously be covered with any black material, by which the reflection will be subdued. If this is not done the pictures will be foggy in those parts where the light shines on the object.

7. *The collodion is turbid* sometimes when ether has been added to reduce it after it has been worked a good deal, and this substance does not work quite so well in such a condition. It is better then to add a little alcohol; shake the bottle, and if the collodion becomes clear sufficient alcohol has been added; if otherwise, add more alcohol until it becomes perfectly bright and clear, when it will be found to give better results. It is scarcely advisable at any time to add ether to collodion without also putting a small quantity of alcohol, for, although the ether is the most volatile of the two, the alcohol evaporates to some extent when the collodion is poured on the plate, especially in hot weather.

8. Not an uncommon cause of failure is the following:—When the negative has been developed, there is seen a misty appearance over some of the shadows—for instance, the hair—giving the object the resemblance of a person wearing a cap, such as that worn by cardinals; the dress, more generally in the centre of the picture, and sometimes even the face, appear as if they had a *halo* round them, there being most chemical action at that particular spot. There are, I am disposed to think, more causes than one for this extraordinary appearance, and it does not seem to me to be at all due to the light entering the camera, as some have supposed, for I have noticed the same peculiar excess of development occur in the hair, face, and dress of each of two individuals taken upon the same plate. After repeated experiments, made with a view to overcome this difficulty, I clearly traced the cause to light entering the dark room, which, strange to say, instead of causing the picture to fog all over, as one would naturally expect, merely caused an excess of chemical action at certain parts of the plate. I found that when I developed the picture at some distance from the yellow glass of the dark room, this defect did not exhibit itself.

9. In sensitising paper for printing purposes, occasionally bright metallic spots will show themselves, but they seldom become visible until the paper is dry, or nearly so. They arise, I believe, from several causes: one of these being through using the funnel in which the sensitising bath has been returned to the bottle, without previously washing it out, or in consequence of employing the same filtering paper more than once. If this be done, the first filtered solution of nitrate should be passed through the paper again before it is allowed to enter the bath, so that all particles resting on the outside of the filtering paper and on the funnel may be retained by the filtering paper. Again, I have found that adding a few drops of glacial acetic acid to the sensitising solution has prevented metallic spots from showing themselves.

10. Sensitised paper sometimes becomes discoloured after a few hours, although well screened from the light. This, I believe, is probably sometimes attributable to allowing the unsensitised paper to remain in a bright light before being floated upon the bath; as, according to M. Niepce's theory, the paper may have absorbed light, which, after the paper is sensitised and dry, may have sufficient active power to dis-

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* Continued from Vol. iii. p 5.

colour the paper. I have generally observed the most highly albumenised paper to become discoloured more speedily than others, probably because it is most sensitive to the most trifling action of light. I think it quite as well to keep the albumenised paper as free as possible from the direct action of a strong light.

(*To be continued.*)

DEVELOPMENT AFTER FIXING.

The *Revue Photographique* publishes two letters on the subject of Mr. Young's development of negatives in broad daylight. The first of these is from Mr. H. Collard, and is as follows:—

"Mr. Editor,—Allow one of your oldest subscribers to say a few words on the subject of development in daylight, discovered by Mr. Young, of Manchester, and theoretically explained from two different points of view by two distinguished chemists, MM. Davanne and Leon Krafft.

"I have practised photography for a long time, which is equivalent to telling you that I am accustomed to every possible manipulation. Well, to my great confusion, I confess that I have tried the *Young* process, and completely failed. On removal from the dark slide, I passed the collodionised glass in the hyposulphite; then, after thoroughly washing it, I poured on the developing solution. I did not obtain the faintest trace of an image. I tried successively pyrogallic acid and sulphate of iron; I changed the quantities of the developing agents, but all in vain.

"I don't pretend to conclude from this that the *Young* process should be definitively classed in the category of the linseed process: I will merely say that the promoters of a new process—those who approve, explain, and recommend it—ought to come to the assistance of poor photographers, who, very ignorant in the matter of chemical theories, want to have the cause of their failures explained to them.

"I desire, Mr. Editor, that my letter may provoke an answer on the part of the supporters of the new process. I shall be very glad if they can prove that it was my clumsiness which prevented me from succeeding."

The second is from an anonymous writer:—

"Mr. Editor,—For some time past there has been no end of observations in the French and foreign photographic periodicals on a communication made by an Englishman, Mr. Young, on the development of proofs in open daylight. In the first place, I don't see the great advantage to be derived from developing in the manner prescribed by Mr. Young. Instead of beginning with the developing agent and finishing with the hyposulphite, he commences with the fixing solution, and ends with the reducing liquid. It will be seen that it offers neither economy of time nor of money. One might, therefore, dispense with noticing a process which has no practical value. If I allow myself to trespass on your columns with respect to this famous method, it is because, astonished with the importance attributed to it, I suffered myself to be led into several attempts to develop by the Manchester photographer's process. As many essays—as many failures! The collodionised glass submitted, in the first place, to the action of the hyposulphite, then, after being washed, covered with the developing solution, never gave the slightest trace of an image.

"I thought my awkwardness was the cause; I made inquiries of several other photographers. . . . . They had all succeeded to the same extent as I had.

"It is deplorable to see continually the pages of photographic journals encumbered with absurd or impossible processes.

"I know that a scientific journal is not bound by all it admits into its columns; but since it must open its pages to all sorts of processes, it must also open them, when necessary, to rectifications. If this were not so, photography would soon become a Tower of Babel." . . . . .

We have ourselves succeeded perfectly in developing pictures after fixing, according to Mr. Young's method. We suspect that the above captious correspondents of our foreign contemporary have not taken the precaution of reading the description of the process first published in the "Photographic News," vol. i., p. 173. Had they taken the trouble to follow the plan there described, before venturing to impugn the accuracy of the statement, they would have seen it there stated that with a collodionised plate *no* result could be obtained: a *collodio-albumen* or *Fothergill* plate was stated to be necessary; and if Mr. Collard and the anonymous writer will be at the trouble to follow the directions given in the "Photographic News," they will find that it will require a considerable amount of clumsiness or "awkwardness" to prevent the success of the experiment.

Dictionary of Photography.

Fraunhofer's Lines *(continued)*.—Besides the fixed lines which are to be observed in the spectrum of sunlight, various artificial flames give a system of lines when observed in a suitable apparatus. These differ from those in sunlight in being *luminous* instead of *dark* lines; in some cases separated from each other by broad, black spaces, and in others seeming to lie upon a continuous spectrum of fainter luminosity. Sir J. F. W. Herschel, in the *Encyclopædia Metropolitana*, has given the following clear *resumé* of what has been observed in this branch of optics:—The analogy of the fixed lines in the solar spectrum might lead us to look for similar phenomena in other sources of light. Accordingly, Fraunhofer has found that each fixed star has its own peculiar system of dark and bright spaces in its spectrum; but the most curious phenomena are those presented by coloured flames, which produce spectra (when transmitted through a colourless prism) hardly less capricious than those afforded by solar light transmitted through coloured glasses. Sir D. Brewster, Mr. Talbot, and others have examined these phenomena with attention; but the subject is not exhausted, and promises a wide field of curious research. The following facts may easily be verified:—

1. Most combustible bodies, consisting of hydrogen and carbon, as tallow, oil, paper, alcohol, &c., when first lighted and in a state of feeble and imperfect combustion, give blue flames. These, when examined by the prism, by letting them through very narrow slits parallel to its edge, all give interrupted spectra, consisting for the most part of narrow lines of very definite refrangibility, either separated by broad spaces entirely dark, or much more obscure than the rest. The more prominent rays are, a very narrow definite yellow, a yellowish green, a vivid emerald green, a faint blue, and a strong and copious violet.

2. In certain cases, when the combustion is violent, as in the case of an oil lamp urged by a blowpipe (according to Fraunhofer), or in the upper part of the flame of a spirit lamp, or when sulphur is thrown into a white hot crucible, a very large quantity of a definite and purely homogeneous yellow light is produced, and in the latter case forms nearly the whole of the light. Sir D. Brewster has also found the same yellow light to be produced when spirits of wine, diluted with water and heated, is set on fire; and has proposed this as a means of obtaining a supply of homogeneous yellow light for optical experiments.

3. Most saline bodies have the power of imparting a peculiar colour to flames in which they are present, either in a solid or vaporous state. This may be shown in a manner at once the most familiar and most efficacious, by the following simple process:—Take a piece of pack-thread or a cotton thread (which, to free it from saline particles, should have been boiled in clean water), and, having wetted it, take upon it a little of the salt to be examined in fine powder or in solution; then dip the wetted end of it in a cup of a burning wax candle, and apply it to the exterior of the flame, not quite in contact with the luminous part, but so as to be immersed in the cone of invisible but intensely heated air which envelopes it. Immediately an irregular sputtering combustion of the wax on the thread will take place, and the invisible cone of heat will be rendered luminous with that particular coloured light which characterises the saline

matter employed. Thus it will be found that, in general, salts of soda give a copious and purely homogeneous yellow.

Salts of potassa give a beautiful pale violet.

Salts of lime give a brick red, in whose spectrum a yellow and a bright green line are seen.

Salts of strontia give a magnificent crimson. If analysed by the prism, two definite yellow lines are seen, one of which inclines strongly to orange.

Salts of magnesia give no colour.

Salts of lithia give a red.

Salts of baryta give a fine, pale, apple green. The contrast between the flames of baryta and strontia is extremely remarkable.

Salts of copper give a superb green, or blue green.

Salts of protoxide of iron gave white, where the sulphate was used.

Of all salts the chlorides succeed best, from their volatility. The same colours are exhibited also when any of the salts in question are put (in powder) into the wick of a spirit lamp. If common salt be used, Mr. Talbot has shown that the light of the flame is an absolutely homogeneous yellow; and being at the same time very copious, this property affords an invaluable resource in optical experiments, from the great ease with which it is obtained, and its identity at all times. The colours thus communicated by the different bases to flame afford in many cases a ready and neat way of detecting extremely minute quantities of them; but this rather belongs to chemistry than to our present subject. The pure earths, when violently heated, as has been practised by Lieutenant Drummond, by directing on small spheres of them the flames of several spirit lamps, urged by oxygen gas, yield from their surfaces lights of extraordinary splendour, which, when examined by prismatic analysis, are found to possess the peculiar definite rays in excess which characterise the tints of flames coloured by them; so that there can be no doubt that these tints arise from the molecules of the colouring matter reduced to vapour, and held in a state of violent ignition.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS —GLASS POSITIVES—(*continued*).

The student may practice with advantage the taking of views upon small glasses until he finds that he can take them with certainty, when he may next turn his attention to portraiture. In working this branch of the art, however, the greatest care must be exerted, for there are many circumstances which will require the utmost vigilance to govern them. There is a great difference between photographing distant scenery and a movable object which is near the camera.

In taking a portrait, the "background" is of the greatest importance, and this should be either white or of some neutral tint, according to the drapery, colour of the hair, &c., of the sitter. For instance, when the hair of the sitter is white and the dress dark, it will be necessary to employ a background which appears neither too dark nor too light in the photograph —a medium grey, buff, or green, will be found to answer the purpose well; but when, on the contrary, the hair of the sitter is very dark and the dress black, it will be better to use a perfectly white background. Again, when the dress is light and the sitter's hair dark, the lower part of the background may be thrown into shadow by bringing the upper part a little forward, by which it will receive a greater amount of light than the lower surface. By this arrangement very agreeable effects may be produced, the background in the photograph appearing of a graduated tone, which, when well contrived, is exceedingly artistic and pleasing. Similar effects may be produced by arranging the background obliquely, so that one side of the picture will appear somewhat lighter than the other.

When the background is arranged, a chair should be placed at some little distance from it, so that when the sitter is in focus, the background will be thrown out of focus.

Posing the sitter is a matter which will require some little judgment, in order that the light may fall properly upon the figure. A three-quarter view of the face generally looks better and less formal than the full face of the sitter; therefore, that side of the face should be chosen which presents the best view of the person, and on which (if it be a male) the parting of the hair occurs—the other side of the face being a little in shadow. As far as attitude is concerned, this must depend a good deal upon taste, or rather fancy; but, for my own part, I prefer allowing the sitter to place himself or herself in a comfortable, easy, and natural position, in preference to the grotesque, distorted, and mock-elegant attitudinising too generally adopted by photographers and their clients. In this respect, if too much is left to the judgment or conceit of the operator, the picture invariably presents a stiff and formal appearance; and the friends of the sitter frequently denounce the portrait, merely because they have not been accustomed to see their friend in such an attitude as that which the portrait gives him.

Again, sometimes the sitter arrives at the photographic studio "got up" for the occasion, attired in a stiff unrumpled coat, with rigid shirt collar and faultless neck-tie, his hair being put up in some eccentric form, that he may perpetuate the perfections of the perruquier's art, little caring to appear before the future world too much like himself. But all this tends to render the photographer's labours to produce a "life-like" portrait futile. To have a good picture, one which will be at once recognised and approved by all, the sitter should neither be dressed as if just taken out of a band-box, nor sit like a spectre. Therefore, when taking a portrait, let the operator recommend him to place himself in an easy and unconstrained position, and to merely "sit still."

A *head rest* is sometimes employed for the purpose of keeping the head quite still during the time when the portrait is being taken, but this article must be used with care, or its employment may give that stiffness which is so undesirable. For my own part I would never use a head rest except in extreme cases, for I am convinced that a better picture is obtained without it. However, a beginner may do well to use one at first, if his sitter is at all likely to move whilst in focus, which, of course, would spoil the result.

After having placed the sitter as he is required to be, and ascertaining that he is in the right position on the ground glass, and appears of a size to suit the plate to be used, he may "sit at ease" until the plate is sensitised and ready for the camera. Of course, before sensitising the plate it will be necessary to have everything in readiness for developing, fixing, &c., and to place the plate holder near at hand.

The stop need not be used in portrait-taking, as it diminishes the speed of the operation, and it is advisable to complete the operation in the shortest possible time, or the sitter may move and spoil the picture; the full aperture of the lens, therefore, should be employed.

When a strong light falls upon the head of the sitter, dark shadows will be seen under the eyes, nose, chin, &c., therefore a white curtain must be suspended over the head, at some distance, so that the light may fall horizontally, and thus be properly distributed over the features. When the light enters from each side of the glass-house, it is advisable to hang a dark curtain on one side, in order to throw a little shadow on one side of the face.

When the sensitised plate is ready for the camera, the sitter should be again focussed before the ground-glass is removed, and be desired to sit perfectly still until the exposure is complete. After a little practice the operator will not allow many seconds to elapse from the time the plate is ready to the period when the exposure is concluded.

In developing a positive portrait, the face and shirt front, or any white object, will appear first, and the next lightest details will then begin to show themselves, when the developing may be stopped, otherwise the picture will be overdone. In a developing room rendered dark with yellow calico, it is scarcely possible to see all the details of a positive picture; and the operator, in waiting to see the half-tones make their appearance, may spoil the result. After fixing and bringing out to the light, those details which were invisible in the dark room, will become apparent at once.

When a good picture has been obtained, after having well washed it, let it be put aside to dry, as before directed. When quite dry, pour some white varnish over the film, if it is intended to back it up with black cloth or velvet; or if black

varnish be preferred, this may be poured on without employing the transparent varnish. It will be necessary, however, to be sure that the black varnish is good, as it is a common defect for this species of varnish to crack after a time, and the picture becomes destroyed beyond the possibility of recovery. When the black varnish is of doubtful quality, it is safer to use black cloth, paper, or velvet.

(To be continued.)

The Amateur Mechanic.

GUTTA PERCHA—*(concluded).*

On commencing to write on the properties and manipulation of gutta percha, and its suitability for all variety of purposes in connection with photography, we solicited communications from our readers for the purpose of obtaining evidence as to the effect of vessels of this material on photographic chemicals, more especially as to its action on the nitrate bath, and we promised a *resumé* of the information thus obtained when the subject was completed. The communications we have received—the most interesting and important of which have from time to time appeared in our columns—have all tended to prove the proposition we set out with, that *pure* gutta percha of the *best quality* is without any deleterious action on a solution of nitrate of silver, either in its normal condition or with a sufficiently acid reaction to ensure perfect working.

An interesting communication from Mr. Alexander Watt, in No. 15 of the last volume, relative to the effect produced on an aceto-nitrate of silver solution by a gutta percha bath he had used, would seem, at first sight, to cast considerable doubt on the subject. Mr. Watt states that an exciting solution, in good condition one day, fogged the plates next morning, after having stood in a gutta percha bath all night. Two drachms of acetic acid to twenty ounces of solution were required to restore the condition of the bath, which kept good so long as it was not allowed to remain all night in the gutta percha vessel. By some oversight, however, it remained there all night again, and *nearly an ounce* of acid was required to produce good results; the acid, whilst correcting the fogging for the time, producing more rapid deterioration so long as the solution remained in the bath; so that, finally, on another occasion, nearly *three ounces* of acid were added before the bath would work. Now, if we simply wished to combat Mr. Watt's conclusions, we might suggest that it is a circumstance that has occurred in our own experience, that a bath acting perfectly one day has refused to work and fogged the pictures next morning, when it has stood in a *porcelain* bath all night. We might suggest many reasons for such a result, but, as they would be based upon uncertain data, we simply put the phenomenon amongst those events—experienced by every photographer in the course of years of practice—which are altogether without explanation. But we are quite willing to admit that such a shrewd observer as Mr. Watt has assured himself that the effect proceeds from the cause to which he has attributed it, namely, the gutta percha bath. But the question is, was it the gutta percha, or *impurities in* the gutta percha? It so happens that in the same number which contains Mr. Watt's communication there appears a letter from Mr. William Boyer, who states that he has had a gutta percha bath in use for three years, and that the solution it contains will produce him either positive or negative, portrait or view, as clear, vigorous and free from fogging as can be desired. Now, if this were the only case in evidence, it does not require much argument to prove, that if these were the results of pure gutta percha in one instance they should be the same in all cases; and that, where other results are obtained, they are from other causes.

In regard to the action of acetic acid, or the aceto-nitrate solution, we have before us the direct testimony of several eminent chemists, that no such action exists. Dr. Muspratt states that, "Soda and potassa, even when caustic and concentrated, ammonia, saline solutions of all kinds, water containing carbonic acid, the various vegetable and mineral acids, do not act upon it." We have not entered into any lengthened experiments on the subject ourselves, but we have now before us a mixture of a forty-grain nitrate of silver solution, with an equal portion of glacial acetic acid, in which is a quantity of pure gutta percha, cut into thin shavings to present a large acting surface: this mixture has stood in the sunlight for several days without the slightest colouration or deposit. We have also, as we have before stated, a gutta percha bath, in which an aceto-nitrate solution has stood constantly for four years without deterioration, and we know of many such cases.

The great error in treating this subject appears to arise out of the fact, that gutta percha is regarded by many as a specific article, always of uniform quality and always pure. The fact is just the contrary: independent of wilful adulteration, the quality of sheet gutta percha varies largely; to express it in money value, some samples may be purchased for a shilling a pound, whilst others cost four times that amount. If we remember rightly, the value of that with which the experiments necessary in the course of this series of articles have been conducted, was three shillings and sixpence a pound; and it is scarcely necessary to observe that the purest that can be obtained should be used for nitrate baths. We stated at the outset that much of a very impure article was used for photographic apparatus by some unprincipled manufacturers; many baths that we have seen are made of such glaringly impure material, that we could easily predicate, *à priori*, the speedy failure of any nitrate solution put into them. We recently tried a built-up bath made of a poor-looking sample of sheet gutta percha.* After an aceto-nitrate solution had stood in it a few weeks, it had acquired the characteristic odour of gutta percha, and completely fogged the collodion plates excited in it. On placing the solution in a bottle in the sun for some hours, a copious black precipitate was thrown down. On filtration, without the addition of acid or alkali, the bath worked well.

The conclusion, then, which we apprehend must fairly be come to, is, that vessels of bad, impure, or adulterated gutta percha are unsafe for chemical purposes;† but that if the pure material is used it possesses, amongst its other very numerous advantages, that of being perfectly innocuous to alkaline, acid, or saline solutions.

(To be continued.)

Photographic Chemistry.

CHEMICAL NOMENCLATURE—*(continued.)*

Water is a compound substance which acts as an acid in relation to strong bases, and as a base in connection with energetic acids; in both cases forming salts. These salts are termed *hydrates* when the water acts as an acid. As to those salts which are formed when the water acts as a base, their names are formed in a somewhat irregular manner; thus sulphuric acid combines with quantities of water, which are to each other as 1 : 2 : 3, and these combinations are called *monohydrated sulphuric acid, bihydrated sulphuric acid*, and *terhydrated sulphuric acid*.

Combinations of metals are termed *alloys:* thus a mixture of gold and copper is an alloy; so also is a mixture of copper and tin. This term is not applied to a mixture of a metal with mercury; in this case the compound is termed an *amalgam*.

The combinations of metalloids with metals is designed by ending the name of the metalloid in *ide*, to indicate the kind, followed by the name of the metal. Thus the combination of iodine with silver is termed *iodide of silver;* that of bromine with potassium, *bromide of potassium*.

Experience shows that the metalloids combine with metals in definite proportions, which are named in the same manner as the oxides. When these binary combinations are subjected to the decomposing action of the voltaic pile, the metalloid invariably flies to the positive pole of the battery, thus behaving as the electro-negative element; while the metal flies to the negative pole, and thus acts as the electro-positive element. Hence in the case of these compounds, as with the salts, the *electro-negative bodies determine the kind, and the electro-positive bodies the species.*

* We have been unable to hear of any case where a moulded bath bearing the stamp of the Gutta Percha Company has injured the solution.

† Mr. Watt states that he has met with similar disappointment on using gutta percha in other chemical operations: electro-plating for instance. We think he must have been similarly unfortunate in his sample of gutta percha, as it comes within our knowledge that a large commercial firm, perhaps the largest electro-platers in England, use vessels of gutta percha solely for electro-plating both in gold and silver, and have recently had a trough made so large that it cost fifty pounds.

The metalloids are of very different natures: some, as oxygen, nitrogen, hydrogen, and chlorine, are gaseous; others, as iodine, sulphur, phosphorus, &c., are solid; the only one existing in a liquid form being bromine. These combine with each other and form a large number of combinations, the nomenclature of which follows the same rule as those of the metalloids with the metals. Sometimes, however, this rule is departed from in favour of a denomination which shall indicate more exactly the relation of the compound with the corresponding oxygenated compound; as in the case of the two combinations of phosphorus with chlorine, which correspond by their composition with the phosphorous and phosphoric acids; and are termed *phosphorous chloride* and *phosphoric chloride*.

Others of these combinations are energetic acids, scarcely less powerful than the strongest of the oxacids; as for example, that of chlorine with hydrogen, forming *hydrochloric acid*, or as it is sometimes termed muriatic acid, and that of sulphur with hydrogen, forming *hydrosulphuric acid*. This class of compounds are termed *hydracids*.

Certain combinations of sulphur with metalloids and metals present a complete analogy with the corresponding combinations of oxygen. The acid sulphides, which are called *sulfacids*, are distinguished from the basic sulphides, which are called *sulphobases*. These two combine and form salts known as *sulphosalts*. Thus, sulphur and carbon form a combination possessing similar properties to carbonic acid, and hence it is named *sulphocarbonic acid*; and just as carbonic acid combines with basic oxides to form carbonates, so also does sulphocarbonic acid combine with certain basic sulphides or sulphobases to form salts which are known as *sulphocarbonates*.

Some combinations of chlorine with metalloids likewise appear to act as acids in relation to certain metallic chlorides, to which is given the name of *chloracids*; and that of *chlorobases* to the basic metallic chlorides; and to the combinations between these two substances the appellation of chlorosalts.

Such are the principal rules of chemical nomenclature; and if they are not unvarying, they are as nearly so as they can be made now, and it seems to us scarcely possible that any change could be introduced which would not be attended with more disadvantages than the present system presents.

CHEMICAL NOTATION: SYMBOLS.

At the commencement of these articles we gave a list of all the elementary bodies known, attaching to each the symbol by which it has been agreed to represent it. In using these symbols certain figures are attached, which serve to indicate the *chemical equivalents of the bodies* which these symbols represent. It would be premature to go deeply into the subject of chemical equivalents in this place; we shall therefore confine ourselves just now to showing how, with the assistance of these symbols, a kind of formula may be composed representing the composition of compound bodies. These chemical formulas are exceedingly useful in representing the chemical reactions in a tabular form, and we shall employ them henceforward, pointing out their signification as we go on with more precision.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 27th September, 1859.

A process of obtaining daguerreotype images on silvered glass, lately discovered in Germany, has found its way into France, and, doubtless, also into England by this time.

The proofs obtained on these silvered glasses are less shiny than those produced upon ordinary plates, but they have a peculiar greenish-grey aspect, which it is hoped will disappear as the processes become more perfect.

For a few years past, the silvering of glasses for astronomical reflectors has been extensively practised in Germany and in France. According to a foreign journal, the first, and, perhaps, the best process of silvering, was invented by Baron Liebig. It consists in the reducing action of *aldehyde* upon a neutral, or an ammoniacal solution of nitrate of silver. Mr. Drayton has employed an alcoholic solution of various essences, in the place of aldehyde, and has obtained very fair results, but the plates presented now and then certain red spots, which rendered them useless. Mr. Wagner modified the latter process by purifying the essence with bi-sulphate of soda. Liebig's process appears, however, more economical: an ammoniacal solution of nitrate of silver is prepared (10 grammes of fused nitrate to 200 cubic centimètres of water); sufficient ammonia is added to procure a limpid solution, and then 450 cubic centimètres of pure caustic soda. A precipitate then forms which is redissolved in ammonia, and any excess of the latter is saturated by a new addition of nitrate.

The solution is then diluted to a pint and a half, or rather more. To this liquid just before it is used must be added $\frac{1}{6}$th or $\frac{1}{5}$th of its volume of a solution of sugar of milk (*lactine*). The glass to be silvered is placed in this bath, supported at its extremities by small cones. It is indispensable that the surface of the glass be perfectly clean and free from grease, &c. The reduction of the salts of silver commences at the ordinary temperature of the atmosphere; the glass becomes first of all black, and afterwards takes a shining metallic aspect. The operation is terminated when the surface of the liquid between the glass plate and the sides of the bath is observed to be covered with a brilliant coating of metallic silver. The plate is then washed without being touched, and dried in a warm place. The layer of silver adheres very solidly to the glass.

The quantity of silver which is thus deposited on a glass surface of a square metre, in dimension is only a little more than two grammes! But a far larger portion of silver is reduced to the metallic state in this operation. The excess is, however, found in the bath, and can be used anew.

This process has been modified in different manners; some experimentalists employ glucose, others citric acid or tartaric acid, instead of sugar of milk; but the results are pretty much the same. It appears that up to the present time these silvered glasses do not present the same advantage to the photographer as the old-fashioned silver daguerreotype plate. But it is thought here that before long the silvered glass will be obtained in a more perfect form, and will then be largely employed in photography.

Who knows but what these new plates may be the first step towards the production of *natural colours?* I have seen coloured photographs obtained by M. Nièpce. They were all obtained on silver plates. He has in one of his rooms a doll dressed in all kinds of colours. This doll has been photographed by him several times, and each time almost all the colours of the dress were produced upon the silver plate. M. Nièpce is obliged to keep these proofs shut up in a box, as they are fast fading, and every time they are exposed to the light, even for an instant only, they are seriously damaged.

M. Charles Chevalier, the well-known optician of Paris, publishes now and then a work on photography. He has just brought out rather an interesting volume, consisting of a collection of memoirs on different photographic subjects, some of the papers of which have been communicated to him by the authors. The volume contains also some optical notes, &c., by M. Charles Chevalier and by M. Arthur Chevalier. I intend to give to your readers extracts of these papers, at least of those which appear to be here published for the first time. To-day I will give you, as a specimen of the work, the remarks that M. Chevalier has published on the action of the solar spectrum upon photographic surfaces; these remarks will be interesting to those who are not so deep in the matter as Sir John Herschel and yourself.

"The chemical action of the solar spectrum," says the author quoted above, "is extremely interesting to the photographer, as it gives him the means of explaining how it is that different objects or different parts of the same object are produced with more or less rapidity on a photographic surface.

"Schéele was, if I am not mistaken, the first to remark

that chloride of silver was blackened very rapidly in the violet rays of the spectrum; then Ritter observed that this substance became still blacker when placed a little distance below the violet ray, and that the degree of darkness attained was weaker and weaker as the chloride approached the red extremity of the spectrum.

"It will be easily understood now why violet and blue colours are so rapidly impressed upon sensitised plates, whilst red colours act so slowly upon them.

"It will not be useless to recall here certain results connected with the production of coloured images, and which Seebeck was the first to specify.

"If a solar spectrum be projected upon a layer of chloride of silver, the latter will remain of a white tint in those parts occupied by the most refrangible rays of the spectrum. The spaces which correspond to the *green*, the *blue*, and the *violet*, will be impressed with these same colours. The violet colour in the image obtained, will be found to be very wide, and to spread itself far lower than the inferior extremity of the spectrum. The orange part of the spectrum impresses itself in the chloride with a *red-brick* colour, which soon becomes *green*, and, finally, *dark-blue*. The *red* has hardly any action, but there exists above the red a space which acts energetically upon the chloride.

"A sheet of paper prepared with chloride of silver and exposed to diffuse day-light before being presented to the solar spectrum, is impressed by all of the coloured rays of the latter.

"The action of diaphanous bodies upon the chemical rays is extremely remarkable, and merits to be noticed. White glass, rock-salt, and blue or violet glass, are the most permeable to these rays, whilst green glass, green mica, yellow beryllum, brown or green tourmaline, red glass and yellow glass, stop these rays, or annihilate their action altogether. It is sufficient to place a sheet of dark green glass or mica before the chloride of silver to prevent any chemical action of light."

I read in one of the evening papers a curious cure of strabismus or squinting. A child twelve years old was afflicted with a dreadful squint in the right eye, half of the pupil of which was completely hidden, and the other half lodged, as it were, in the larger corner of the eyelid. The child had never made use of this eye, and, when the left eye was closed, could only distinguish exterior objects with extreme difficulty. It had been remarked, however, that when the left eye was kept closed, the right came back into its natural position, or nearly so. One day, the poor child received a blow from an arrow in the left eye, and became perfectly blind, having completely lost the left eye and not being able to see sufficiently to read with the other. However, in about two months time external objects began to be perceived with the right eye, which regained more and more its proper position; and at the present time the child can see and read with ease. M. Colson, who made these observations, feels convinced that if people afflicted with a squint in one eye would bind up the other for a month or two, the strabismus would be perfectly cured without having recourse to any other means.

M. Ed. Harms has published in the *Journal de Pharmacie et de Chimie* an easy method of cleansing bottles, &c., which retain resinous or oily matters. This is of constant occurrence in laboratories. The method consists in employing animal charcoal and alcohol. A little of the latter is placed in the bottle, sufficient to wet the inside; some animal black is then thrown in, and water being added, the whole is shaken together. The action of the charcoal in these circumstances depends, according to the author, on the property which this substance possesses of taking up alcohol which is mixed with a watery liquid, so that the resinous or oily matters dissolved by the alcohol penetrate into the pores of the charcoal; the water after the washing is quite clear and not at all milky.

M. Lintner has made known a new method of discovering phosphorus in cases of poisoning by lucifer matches, and the process consists in the action of phosphorus upon salts of copper. Phosphuret of copper is formed, to which some cyanide of potassium is added, giving rise to phosphoretted hydrogen gas, which is easily recognised by its odour, &c. The substance which is supposed to contain phosphorus, is placed in distilled water, to which enough sulphate of copper is added to give to the liquid a blue colour; the solution is then boiled for some time. If phosphorus is present, black spots are seen to form, which consist of phosphuret of copper mixed with a little phosphate of copper, these are collected on a filter and washed. Without waiting until it is dry, the matter collected on the filter is placed in a test-tube and a little cyanide of potassium in powder is sprinkled over it. There is an immediate evolution of phosphuretted hydrogen gas, which is recognised by its nauseous odour, approaching to that of garlic, and by the black colour that this gas gives to a slip of paper imbued with nitrate of silver.

Not long ago the same chemist announced the frequent presence of lead and tin in snuff; in endeavouring to account for this, M. Lintner found that a thin sheet of tin or lead is corroded more or less rapidly by contact with tobacco. In about four weeks' time the sheets of metal were found to be pierced in a number of places, and presented numerous small holes. The tin had lost during this time 2·71 per cent. of its weight, and the lead 4·92 per cent.

M. Du Bois-Reymond, the well-known physiologist, has lately investigated the contradictory opinions of chemists and physiologists, relating to the nature of the acid which communicates an acid reaction to muscular tissue. Some have assumed that it is a peculiar volatile acid, others that it is lactic acid, others again attribute the phenomenon to phosphoric acid. M. Du Bois-Reymond, endeavours to show that, although the existence of a free acid in living muscular tissue has been admitted without contestation for about half a century, generally speaking, no acid is to be found in a free state; that the acid which chemists have found in the flesh of animals, probably only becomes free when this flesh begins to undergo decomposition; and, finally, that an acid becomes free in living muscular tissue only when this tissue is put into violent and prolonged action.

M. Regel, director of the Botanic Gardens of Zurich, has discovered a new method of obtaining cuttings from plants, which is invariably attended with success:—

A certain quantity of charcoal in powder is mixed with a solution of gum-arabic, so as to form a thickish kind of paste; the extremities of the young shoots or cuttings are plunged into this paste, which is allowed to dry a little on them; they are then planted in a light soil of fine texture, or in fine sand mixed with a little earth. The success of this system is doubtless owing to the antiseptic and absorbent properties of the charcoal preventing the tissue of the young plant, which has been laid bare by the knife, undergoing decomposition or putrefaction, by the combined action of atmospheric oxygen and the warmth of the soil; and forming as it were, a reservoir of condensed gases, wherewith the young roots may be nourished.

Miscellaneous.

The Points of the Compass from a City Point of View.—We have recently had a number of photographs submitted to us of objects taken in London, which furnish another proof of how little the generality of people know of the picturesque objects to be seen in its streets. Among these photographs was one of Ludgate-hill and St. Paul's, printed from a negative taken from the obelisk at the end of Fleet-street. In looking at this, our attention was directed to a circumstance which quite upset all our ideas with respect to our geographical position. Farringdon Street is represented by a letter fixed on the corner house, as running south, and New Bridge Street, north; and the individual who fixed the letters having an excellent recollection of the fact taught him at school, that when he looked towards the south his right hand pointed to the west,

and his left to the east has carried this knowledge out in practice by representing Ludgate-hill as ascending towards the west.

PHOTOGRAPHS TAKEN FOR GOVERNMENT INSTITUTIONS.—To enable the public to derive full advantage from the photographic negatives made, officially, for the Science and Art Department, from rare and valublo objects in public and other collections, British and foreign, the Committee of Council on Education has caused an office for the sale of photographic impressions from such negatives to be established at the South Kensington Museum, which will be opened on the 3rd of October. Photographic negatives made by order of the Trustees of the British Museum, and for the War and other Government offices, will also be sold. The tariff for unmounted impressions will be as follows: a single impression, the dimensions of which contain less than 40 square inches, *e. g.*, 5 × 7 inches, or 4 × 8 inches, 5*d*. Above 40 square inches, 2½*d*. should be added for every 20 square inches or under. A detailed list of the objects photographed is printed, price 2*d*. The department dees not charge itself with the mounting of impressions, as the public is able to do this for itself.

Photographic Notes and Queries.

QUERIES ON CAMERAS.

SIR,—It is with much pleasure I have perused in the "PHOTOGRAPHIC NEWS" of the 9th, 16th, and 23rd inst., the very useful information and remarks of Mr. A. Watt and H. S. I. They need no observations as to the utility and value they must prove to the amateur, but more so to those about to begin the very interesting art of photography, and I truly hope both Mr. A. Watt and H. S. I. will continue to favour your numerous subscribers and readers with more of their exceedingly useful information.

There is, if I mistake not, one subject that has been very little at any time touched upon, except to notice some new invention or improvement, and that is "the camera." The lenses have received a vast amount of attention and inquiry, and some excellent articles have frequently appeared, which have led to considerable improvements. The chemicals, also, have received a considerable amount of inquiry and research; but in no work have I seen or read any useful and instructive information upon the subject of the camera. It may be that you intend to favour us with a full description of the instrument in the course of your excellent work, appearing from week to week, viz.: the "Amateur Mechanic." We have the rigid camera, the bellows camera, the folding, the stereo, with Clark's arrangement, the twin lens, &c., and each of them have been modified and improved from time to time. If I am wrong, I trust you will excuse and correct me; but what I much wish to see is some good article or articles in your excellent publication descriptive of the camera—its various sizes, make, and kind, and pointing out the utility of each as applied to the different branches.

There are other points I should wish to call your kind attention to; but fearing I have already taken up too much of your time and space, I will defer them, hoping these few observations may be the means of some of your talented contributors favouring your numerous readers, especially the amateurs, with an article or articles upon the subject I have mentioned. C. J. M.

[Articles on this subject have for some time been in preparation; meanwhile, may we ask some of our talented correspondents to favour us with the results of their experience with the different varieties of camera mentioned above?—ED.]

CONSTRUCTION OF A GLASS BATH.

SIR,—I beg to congratulate you upon the close of your second volume, and am glad that your preliminary anticipations have been realised.

A correspondent inquires respecting gutta percha. I have used it for years for moulding for electrotypes, and have found it as brittle as glass, and, upon some occasions, so sticky and unmanageable, as to occasion a great deal of trouble. I believe it to be sensibly affected by temperature, and, in my hands, unfit for baths.

I make my own glass baths, and, if you think it worth the room in your journal, I can recommend the following:—Take two sheets of *plate* glass a little larger than your collodion plates; nine slips of *plate* glass, quarter to half inch wide; and a bottle of shellac dissolved in spirits of wine—rather thick. Place one of the sheets of glass on a stout piece of paper; then paint one-third of the slips with the shellac, and put them carefully round the sides, *upon* the glass (not on the edges); the ends must be square, and placed quite close; then paint them well once, and do the same with the other six, so as to form a rim or edge to the sides of the plate. Arrange the junctions of the slips, so that one may not be over the other; then paint the uppermost, and place the plate upon it; lift it carefully into a cool kitchen oven, put weights upon it, and leave it until cook wants her oven for next day's baking; and, *before* she has it *quite as hot* as she means it to be, take it out (don't burn your fingers), and let it cool gradually; you can then set it on a stand or in a frame. You may thus have a bath at one-fourth the cost of the usual glass baths, and with this advantage, that it may be made for a large plate, and a very small quantity of solution. The slips must be all of the same thickness, and the whole must be perfectly flat—*patent plate* or *plate* should be used.

Some years ago I saw a method given to take the collodion pictures off upon paper by using shellac and borax. I used it successfully, but have forgotten the *modus operandi*, and cannot find the receipt. Can you help me to it? T. P. BATH.

PRESERVATION OF GUM ARABIC SOLUTION.

SIR,—I can confidently corroborate your statement (vol. iii. p. 11) as to the efficacy of camphor in preserving a solution of gum arabic (good British gum) from turning acid; but, as regards the *boiling* of the solution, I beg to differ, because, in the first place, I once did boil it, and the process of fermentation seems only to have been accelerated thereby; and secondly, because the mucilage must, for either boiling or filtering, necessarily be too dilute for mounting photographs, unless it be subjected to the additional process of evaporation.

Then, again, the plan of dissolving heavy bodies in fluids specifically much lighter, especially where stirring is inconvenient, seems to me almost of a piece with warming a fluid from the top.

The mode I have lately adopted is this:—A wide-mouthed glass vessel is filled to about three-quarters with distilled water; the gum is tied up in muslin, or similar fabric, and submerged, but yet kept suspended by a thread in the upper stratum of the water. In a minute or so, the dissolving action is plainly seen to have commenced. The dissolved particles fall to the bottom of the glass, and continue to do so (say, over night), till all the pure gum is dissolved.

This solution, however thick, is remarkably clear and clean, and, with camphor, will keep sweet for a long time.

I have not as yet been able to try the above plan for dissolving pyroxyline, which, I think, must be a step in photography; but, when ready, I shall be happy to give you the result of my experiments. N. ENNEL.

PRINTING BY DEVELOPMENT.

SIR,—Will you allow me to ask, through the "PHOTOGRAPHIC NEWS," for details of experience in development printing, from any of your correspondents who have tried some of the various methods now before the public, with pretty constant success? There is as yet an absence in the "NEWS" of that large amount of minute hints and various experiences on the subject, which so many other photographic topics have elicited. "θ's" article on development printing is its own interpreter, but it is confessedly only a

contribution to the subject. The make of paper used, whether gelatinised or albumenised; the formulæ; whether printing in shade preferable, where sun can be had; what colour the outside strip should reach in the frame; or whether the slightest change under light the eye can detect, is all required; how long to wash from the developer; whether to tone or not, and if so, what bath suits development prints best, and how it is dealt with, are amongst the points I should like to see discussed, now the halcyon days of sun-painters are shortening.

My own process is Sir W. J. Newton's. If that gentleman would describe at length how he carries it through, he would much oblige one who was formerly also his disciple for the calotype. PHOTO. BEYOND RAILWAYS.

STAINS IN THE FOTHERGILL PROCESS.

SIR,—Your correspondent "Success," in the "PHOTOGRAPHIC NEWS" of August 6th, 1859, confidently states, that the marblings in the Fothergill process arise from the mode of washing off the albumen, viz., under a tap, or out of a jug, instead of in a dish. Now, as this is calculated to mislead many an ardent admirer of the process, I am prompted to deny it altogether, from the fact that I have followed the Fothergill process nearly ever since its introduction, and have never adopted any other plan *than washing in a dish*, and have, on very nearly every occasion, met with some of these vexatious marblings. I am most sanguine to get rid of this bore, and think that ere long I shall conquer the difficulty, but am certain that the mode of washing has nothing to do with it; neither do I believe that the freshness of the albumen causes it, as stated by a former correspondent, who advised the use of stale albumen. My opinion of stale and impure albumen is, that it is calculated to give you a series of markings and stains not to be found in the scene you may happen to be depicting. WILLIAM BOYER.

ANSWERS TO MINOR QUERIES.

DILUTING COLLODION.—*F. A. X.* You will find the best thing to add to your collodion when it is too thick for use, to be a mixture of equal parts of the best ether and absolute alcohol. If ether be employed alone, and the collodion employed contain iodide of potassium as an iodiser, some of it will be liable to be precipitated as a white powder, forming spots on the film. In very hot weather it is a great advantage to dilute only with "absolute" alcohol (sp. gr. ·800), adding one drachm to each ounce. This will remove greasy lines and prevent the film from becoming surface dry. This addition of absolute alcohol to the collodion will do good in another way. In cases where the plate on development shows lines running down it in the direction of the dipper like streaks of muddy water, they may be frequently removed by diluting the collodion with alcohol. Care must be taken, however, that the alcohol used be really pure, or it will be unsafe to add it with the intention of being any improvement to the collodion.

DIMINISHED SENSITIVENESS OF OLD COLLODION.—We are of opinion that the cause of the diminished sensitiveness of old collodion depends upon the presence of some reducing substance in collodion, such as aldehyde, which has been shown to be a product of the decomposition of alcohol under the influence of iodine. At first sight it might appear that a reducing agent in collodion would be favourable to sensitiveness; but on the contrary, it has been fully established that the addition of substances like sulphurous acid, aldehyde, alloxantin, pyrogallic or formic acid, tends to considerably weaken, if not wholly destroy, the action of the light. It is on this account that the purer the alcohol and ether are from which the collodion is prepared, the more sensitive the collodion usually is. Another reason of the diminished sensitiveness of old collodion, and also of new collodion to which iodine has been purposely added, is that the small quantity of iodine present in the film, along with the iodide of potassium, gives rise to the formation of *iodate* of silver and free nitric acid, and both these bodies have a very retarding action upon the sensitiveness of the film.

TO CORRESPONDENTS.

EXCELSIOR.—Judging from the print, you have not been so unsuccessful as you imagine: the negative seems very good, and if the print had been kept for a longer time in the toning bath, the colour would have been much improved. You cannot do better than pursue the same plan you have hitherto adopted until you have gained sufficient confidence and skill to be able to take a good picture. If the collodion is good you ought to have no difficulty in getting good density in your negatives. Use a rather old and red sample.

A. G. W.—1 and 2. The brilliant sediment in your developing solution is metallic silver in fine powder, and it is this powder which adheres to the surface of the plate and causes the spots your refer to. The remedy is to keep the developing solution always clear and filtered. 3. Burn it again in a crucible, throwing in a little nitre, from time to time, until the incandescence ceases.

MECHANIC.—The lens No. 2 would, in our opinion, answer your purpose best of those you mention; but a portrait combination with an appropriate stop in front would be better than all. The reason why some lenses of the same aperture and focus are quicker than others is, that the glass may be clearer in one than in the other, and also that some (No. 2 for instance) will work equally sharp with a larger stop than the others.

H. S. L.—1. You must use a very old collodion, or one containing glycyrrhizine, or similar organic matter; a landscape lens is also generally used, and the print should be in the sun. A good pyrogallic developer should also be employed, and if the first development does not give sufficient intensity, try a process of redevelopment after the picture is fixed. 2. We know no other way than marking the initials on the face of the negative.

PHOTO. BEYOND RAILWAYS.—Your letter on development printing shall receive attention. 1. There is no objection to fixing with bromide of potassium, if you find that the pictures so fixed stand *time* and *strong sun*. 2. We think the slight yellowness in the whites cannot be obviated: it is inherent to the process, we fear.

EXCELSIOR.—1. We prefer the aplanatic, to all we have tried. Write to the maker, who will most likely make one to suit. 2. You had better omit the cadmium from a collodion intended for the collodio-albumen process. With that exception your iodiser is good. Add about four grains of the mixture to each ounce of collodion; the same bath will do as you usually employ.

P. Y. G.—Your photographic print is excellent. Instead of attempting to give you instructions, we must ask if you cannot favour us with some hints on the various points of manipulation. It would be very interesting just now if you were to forward to us a short account of your plan of working. How is it printed? Do you prefer glazed cards?

SUBSCRIBER.—1. A landscape lens of the ordinary construction is too slow for taking portraits with, except in very bright light in the open air. 2. Allow the collodion to settle for a few days, and then decant off the upper half into a clean bottle for use. 3. All the prints are very bad, both as to colour and purity of whites. They look as if they had been toned too long.

ORIGINAL EARNEST.—1. We think the one-sixth size will be the best for what you want. 2. Try redeveloping the plate, or intensifying it after fixing. You must remember that the proper colour for the sky in a negative is not opaque, but a half tint. 3. Kneel down and creep underneath.

W. B. H.—In our next list. The names you refer to will be omitted from future lists, unless great improvement takes place. We are obliged by your communication, and the bad pictures sent for our inspection. We have returned them, as requested.

W. W. C.—We do not think that your being short-sighted need prove a hindrance to your progress in the photographic art, as all the operations in photography require the operator to be possessed of distinct vision at a few inches off.

W. A. T., as an inducement for us to answer a trivial question, informs us that he has been a subscriber to the "PHOTOGRAPHIC NEWS" for *sixteen months*. Let him look at the date of our first number.

G. T. M.—We cannot decide between the two makers; neither of them are considered very high amongst apparatus dealers. Use a twin lens camera with Latimer Clarke's adjustment.

MUDDLE.—You had better get a fresh dipper, the solution has penetrated through and spoiled the present one. It would not neutralise the action, but rather accelerate it.

R. D.—1. Wash the print in plenty of water in which a little salt has been dissolved. 2. Nothing but well washing will do. 3. We have heard good accounts of these frames before from other parties.

AN AMATEUR.—A photographic plate, if exposed in the camera for a sufficient time, would certainly yield an image, but it would occupy far more time than could, under ordinary circumstances, be given.

J. S. O.—The letter shall be forwarded. The prints have arrived, and we consider them very good for the subjects, and likely to sell amongst the class of persons you mention.

RETICULUS.—We are decidedly of opinion that the paper tablet would injure the bath. The metal tablets, if well enamelled, are not so dangerous.

A READER OF "THE NEWS."—We will consider whether the desired article can be given.

CONTRIVER.—The picture *ought* to be stereoscopic; very possibly it is wrongly mounted; try the effect of changing the sides of the two halves.

A. KEENE.—Many thanks for the print; it is a very excellent specimen. We shall be pleased to see your pamphlet.

J. HOLLIS.—The views have since arrived; they are very good, and your name shall be inserted in the next list.

A. C. R.—1. The best plan will be to add more silver to the bath. 2. Good shellac varnish, or a solution of gutta percha in chloroform.

R. M. S.—Apply at a photographic apparatus dealer's: you had better either see a specimen of its performance, or try it yourself before purchasing.

T. C.—Your prints are not sufficiently up to the mark for us to insert your name in the list.

S. D. S.—It may be fixed in the ordinary way with hyposulphate of soda.

AN AMATEUR.—You must give longer exposure.

F. P., and G. N. D.—In our next list: the views are very good.

Q.—Received.

Communications declined with thanks.—F. R. O. G.—John.—C. R.—O.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—P. N.—L. E. S.—X. Q.—Illy.—W. W. W.—Amateur Optician.

IN TYPE:—M. Léon Foucault.—M. Van Monkhoven.—M. A. Root.—J. N.—B. M. Brackenridge.—R. J. Fowler.—F. D——m.—W. R. Hurst.—A. Goodfellow.—E. S.—Aliquis.—Nemo.—E. M.—Sphynx.—A. Watt.—G. H. W.—D.—

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

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APPLICATION OF GLASS SILVERING TO PHOTOGRAPHY.

It appears that they have recently succeeded in Germany in obtaining daguerreotype pictures on silvered glasses. The proofs, we are told, have much less metallic glare than those produced by the ordinary plates, and have a greenish-grey reflection, which it is hoped may be removed by a special burnishing. For us, in fact, the greatest obstacle to the application of silvered glass in photography rests on the polishing of the film of metallic silver, deposited chemically on the glass. The art of silvering glass has been known for many years, and looking-glass makers and others have availed themselves of it in various ways. MM. Steinhel and Foucault have applied it in a most useful manner to astronomy, by replacing the metallic reflectors of telescopes by silvered glass mirrors. It is now the turn of photography to derive some benefit from it, and we should be failing in our mission were we to confine ourselves to merely mentioning this progress without putting our readers in the way of benefiting by it.

The first, and perhaps the best, method of silvering glass was discovered by Professor Liebig, by causing aldehyde to react on a neutral or ammoniacal solution of nitrate of silver. But aldehyde, being purely a substance of the laboratory, could only serve for obtaining some rare specimens of a manufacture then only in its germ. Drayton, by utilising on a large scale the action which alcoholic solutions of the essences of cassia, cloves, &c., exercise on ammoniacal nitrate of silver, contributed to bring the new silvering into common use. The products, very fine at first, had the drawback of becoming covered with red spots after a certain lapse of time. It was then that Wagner, studying the phenomena which govern the reduction of the nitrate of silver by the essences, found that among these latter those which enjoyed this property in the highest degree were of the composition of aldehydes; and he advised more especially the use of the essences of camomile and rue, previously deprived of the hydrocarbons which accompanied them. To obtain this separation, the essence—that of rue for example—is strongly shaken with a highly concentrated aqueous solution of bisulphite of soda. Crystals are formed, which are well pressed, and then dissolved in water. After filtering, dilute sulphuric acid is added, which sets the pure aldehyde at liberty. The essence of rue, thus purified and deprived of all resinous matter, is dissolved in an alcoholic solution of ammonia. Mixed with a solution of nitrate of silver, it gives an excellent silvering. The essence of sassafras is equally good as a reducing agent, but it does not admit of the purification we have just described.

Liebig has published a method, which is at the same time more simple and more economical; it is as follows:—10 grammes of fused nitrate of silver are dissolved in 200 cubic centimetres of water, ammonia added in a sufficient quantity to make it very limpid, then 450 cubic centimetres of a solution of caustic soda free from chlorides, and of a specific gravity of 1·035. A precipitate is formed which is redissolved in caustic ammonia. To completely saturate this ammonia with silver, nitrate of silver must be added until a permanent grey precipitate is formed, the solution is then diluted with water, until its bulk is about three pints.

This liquid immediately before use must be mixed with from one-sixth to one-eighth of its volume of an aqueous solution of sugar of milk, containing one-tenth of its weight of sugar. The vessel holding the solution, whether it be of glass, porcelain, or gutta percha, ought to be of a symmetrical form similar to the glass to be silvered, so that there shall be the same depth of solution all over it; this should be from one and a half centimetres to two centimetres. The object to be plated should be supported on small cones, its under surface being in uniform contact with the solution. The reduction commences at ordinary temperatures from the moment when the solution of sugar of milk is added. The glass, the surface of which should have been carefully cleaned and finally washed with alcohol, becomes black in the first place, then gradually assumes a metallic appearance; and when a bright film of silver can be seen on the surface of the liquid between the glass and the vessel, the operation may be considered to be completed. Remove the plate and wash it well without touching the film, and dry it in a warm place. The film when dry adheres very strongly to the glass, and may be polished with velvet and exceedingly fine rouge.

The process employed by Mr. Lowe for silvering glass is as follows:—In five pints of water dissolve about a pound of glucose, and slake therein rather less than a quarter of a pound of pure quicklime; filter in a closed vessel and put the liquid by in well-corked bottles. Dissolve fused nitrate of silver in water in the proportion of one part of nitrate of silver to twenty-two parts of water, and add ammonia to the solution by slow degrees, until the precipitate formed in the first instance is perfectly dissolved. To silver the glass, equal volumes of the two solutions must be poured into the dish; and to prevent the greater part of the silver from being deposited uselessly on the sides of the vessel, the latter should be well soaked with the silver solution before the other solution is mixed with it.

The argentiferous liquor used by Mr. Hill is like the preceding: a saturated solution of ammoniacal nitrate of silver (one part nitrate to two of water and a sufficient quantity of ammonia). To this solution add twenty parts of water holding one part of glucose in solution, a little mannite, and a few drops of ether. The glass to be silvered is immersed, and the whole heated in a water bath, a backward and forward movement being communicated to the liquid until the operation is completed. M. Massé uses citric acid instead of glucose. MM. Delamotte and Pron use, as reducing agents, organic compounds, which contain nitrous vapour in place of hydrogen, as pyroxiline for example. They dissolve this body in soda or caustic potash, and mix it with ammoniacal nitrate of silver. They conduct the operation of plating at a temperature of from 140° to 150°. The most practical process of all, however, is that of M. Petitjean, which is as follows:—Prepare two argentiferous solutions. For the first take 180 parts of nitrate of silver, which treat with 62 parts of liquid ammonia, of a specific gravity of about 870°, and 500 parts of distilled water. Filter. This solution is afterwards diluted with sixteen times its volume of distilled water, to which is added, drop by drop, seven parts of tartaric acid, previously dissolved in 30 parts of water. This is No. 1 solution. The second solution is prepared in precisely the same way, only it must contain double the quantity of tartaric acid.

After having cleaned the glass with putty powder mixed

with water, by spreading it over the entire surface with a ball of chamois leather and leaving it to dry for a few minutes and then rubbing it off with another piece of chamois leather, or a soft linen cloth, this glass is placed on a rack, and an india-rubber roller, moistened with distilled water, passed over it to remove any particles of dust that may adhere to it. After this it is laid upon a metallic table, covered with a waxed or varnished cloth, and heated to about 120°. The plate, being in a perfectly horizontal position, its surface is covered with No. 1 solution. The deposit of silver commences in about ten minutes, and is completed in about fifteen minutes afterwards. The glass is then tilted up so as to allow the liquor to run off, and rinsed with water, rather more than lukewarm, to carry away the non-adherent powder; it is then restored to its horizontal position, and covered with solution No. 2. In a quarter of an hour the deposit is completed. The next thing is to wash the plate as before, and dry it, after which it only remains to polish and burnish the film of silver deposited, in order to make it perfectly smooth and give closeness to the grain. The chemical agents used in taking daguerreotypes will act on this plate precisely as on the plated metal plates or on silver plates, nor is there any inferiority in glasses so prepared to the plates hitherto used; on the contrary, they have some very important advantages.—*La Lumière.*

PHOTOGRAPHIC FAILURES—THEIR CAUSES AND REMEDY.*

BY ALEXANDER WATT.

11. I have lately had an opportunity of witnessing a peculiarity in a sample of collodion which was handed to me to ascertain whether it worked well. I had but a short time before returned, as unfit for use, some collodion which I had purchased at a certain establishment, it being so considerably over-iodised and rotten that the film came off in the bath. The next sample was a mixture of that just referred to, and an older collodion. Now, not only was this article very unsensitive, but I observed, although it did not appear over-iodised, that it formed a thin transparent pellicle upon the surface of the bath, which produced a very mischievous result, as follows:—After developing, when the plate was developed and fixed, on looking through it there appeared in places certain semi-transparent specks—some of a triangular form. In one plate there were about a dozen of these, varying in size from a large pin's head to that of a very minute speck. In examining these defective spots, I discovered that the impression appeared to be about half done where the thin pellicle had rested; and, in several instances, a piece of the "scum," if I may call it so, had moved—I suppose by a jerk of the plate—to about an eighth of an inch lower down, and, curiously enough, there were two spots of exactly the same shape and size, evidently caused by the same obnoxious matter having moved whilst the film was wet. On looking into the bath, I observed almost the entire surface covered by the thin pellicle referred to. I at once filtered the bath, and thus removed the offensive matter, which, being retained by the blotting paper, when brought out to the light, each particle became darkened, and at once showed that it was a very attenuated pellicle, containing a little iodide of silver, which soon darkened when exposed to the light. I may mention that the collodion referred to appeared to have an exceedingly small amount of pyroxyline, as it was the thinnest collodion I have ever worked with. It occurred to me, that if I were to mix it with a very glutinous collodion, it might, probably, remedy the defect alluded to; I accordingly did so, and found that I obtained exactly the same results, though the pellicle formed on the surface of the bath was not quite to the same extent; the spots, however, subsequently showed themselves upon the picture, so I abandoned the collodion, as utterly worthless and irremediable. My reason for dwelling so long upon this theme is, that I think it highly probable that some of the readers of this journal may be unfortunate enough to have got hold of some of the article referred to, in which case they will find, like myself, I fear, that no good can be done with it; it being only worth the ether and alcohol it contains, which may be readily distilled from it in a vessel of boiling water.

12. A *metallic appearance* is occasionally seen upon a negative, after developing and fixing it, which shows most distinctly upon the *glass* side of the plate, and it generally happens in such a way as to spoil the picture. There are several causes for this, I believe; sometimes it occurs when using a glass which has been used before, and on which the collodion with the image upon it has been allowed to dry. When a very thin collodion has been used, such as Thomas's formerly used to be, the image becomes so closely attached to the plate that nothing will entirely remove it but repolishing the glass. In many instances, after the plate has been washed, I have seen the impression still upon the glass alone—the film being entirely removed from the plate. When a second picture is taken upon this, in the process of development the first image becomes, as it were, reproduced, partially, so that it appears beneath the other, shining with metallic lustre. It is a very extraordinary thing that the first image, although the collodion upon which it was impressed is removed, should come forth again to a certain extent; but I believe it to be by no means an uncommon occurrence. The action of the developing agent at those parts where there is a trace of the old image seems to be increased in vigour. What can account for this? Has M. Niépce's theory of the absorption of light anything to do with it? I confess I am unable to answer this question, but I think the matter worth consideration.

Again, the metallic appearance upon the negative sometimes arises from having employed, in the process of cleaning the glasses, cloths or leathers which have, from long use, become soiled by the perspiration, &c., and this, from some cause or other, will occasionally tend to favour an excess of development at that point where the glass is not clean, whilst at other times there will be less chemical action where the cloth or leather, having something objectionable upon it, will leave a smear.

13. In warm weather I have frequently known the cloths used for wiping glasses, after having acquired, as they naturally must do, a considerable amount of perspiration from the hands, to cause numerous spots which appeared *opaque* when breathing upon the glass. Of course for this there is no remedy but washing the glasses, and wiping with fresh cloths. It is prudent, when it can be done conveniently, to boil the cloths with a little soda before giving them the final rinsings, as in hot weather, mere washing with water, in which a little soda has been placed, will not clean them thoroughly. In polishing the glasses with a leather, after they have been wiped upon a clean cloth, it is well to inclose the hand in a clean Berlin glove, kept for the purpose, by which means the latter will keep free from perspiration and other objectionable matter.

14. In using "flatted crown" glasses, it not unfrequently happens that they are somewhat bent, and if the collodion is poured upon the convex side of the glass, when it is placed in the plate carrier, the spring pressing upon the plate will bend it still further, by which the upper and lower part of the plate, or its centre, will be somewhat thrown out of focus. If, however, the collodion be poured on the *concave* side of the glass, the spring, gently pressing upon the centre, will probably straighten it, and the resulting picture will be perfectly in focus all over. If the glass breaks in this operation, which is possible, but not probable, it is better that it should do so now than when the negative is placed in the pressure frame. It is a good plan, when a glass is found to be much bent, either to abandon it altogether, or to try it in the pressure frame; when, if it does not break, it may be used as described with certainty.

* Continued from vol. iii. p. 42.

Occasionally, in using flatted-crown glasses, it will be observed that there have been certain marks or figures written upon the glass, either as a private mark of the glazier's, or of the manufacturer's. This, I believe, is generally done with soap, and it will be advisable to clean such a glass with cyanide of potassium.

15. The chloride of gold which is sold for photographic purposes frequently contains a little acid, and as this is prejudicial, inasmuch as it affects the tone of the print, it is advisable to add a few grains of chalk—common whiting will do—to the toning-bath; or a few grains of carbonate of magnesia will answer the purpose well. The toning-bath should be filtered after employing either chalk or magnesia. As it is better and more economical to make the chloride of gold, in a future number I will give a description of an easy and safe method of preparing this article; and I am confident that photographers will derive advantage in every way in making the chloride for themselves.

16. When the water used in washing the plates, after development, is suspected to contain particles of matter floating about in it, which is very likely to be the case when the water comes directly from a cistern, especially soon after the water has come in from the main pipe, I have found it a good plan to tie a piece of linen rag, or several folds of fine muslin, over the tap, which will retain everything objectionable. The muslin should be changed every now and then, when it will be found to contain a quantity of black mud. This being allowed to fall on the plate during washing, would cause particles to adhere to the plate, which sometimes prove exceedingly annoying. Water, strained as I have stated above, comes over quite clear; and as it falls gently on the plate, it has the double advantage of not being so liable to wash off the film. The muslin bag, however, should not be allowed to hang too low, or it may be apt to touch the film, which of course would destroy it.

(*To be continued.*)

OBSERVATIONS OF THE SPOTS AND FACULÆ ON THE SUN.

BY M. LE P. SECCHI.

The study of the solar spots has recently acquired considerable and peculiar importance from the insight they give into the physical constitution of that luminary. Without presuming to criticise the systems of observations actually adopted, it cannot be denied that they leave much to be desired in order to insure the success sought for. Generally, indeed, the observation is confined to counting the number of spots visible at any particular moment, and, consequently, the results are mixed with those arising from the variations of the atmosphere, which complicate the law of apparitions. Beside this, as there is necessarily much that is arbitrary in the distinction of the groups according to the observers and the apparent power of the telescopes, the results of different epochs are not easily comparable: this simple method is, moreover, insufficient for the recognition of the position of the spots, so as to show whether they exhibit themselves in the same part of the sun. On the other hand, the exact methods of astronomical or photographic observation require too much time to be available to everybody.

As in this matter (at all events for the present) a continued series of observations is of more importance than minute exactness, which in the present instance is out of the question, I conceive that a purely graphic and very expeditious method would be preferable to any other, as much on account of the observations as the reductions. Hence the system I have introduced into the observatory is one of this kind, and, with very slight interruptions, has been in use for the last year, with somewhat remarkable results, which results I shall alone give you, as the details would be somewhat out of place.

1. The solar image formed by an object glass, with an aperture of six inches, and a focal length of seven feet, was projected on a screen, and a sketch taken of the spots and faculæ almost every day; now, if on the circles which represent the solar disc, we trace the diameter of the ellipse in which the solar equator is projected at the moment of observation, it will be found that in general the faculæ are disposed in groups on either side of this line, and generally to the number of four. The equatorial zone is usually without either spots or faculæ, and this distribution has been so constant and so strongly marked during the last six months, that one could trace the direction of the solar equator simply by the distribution of the faculæ. It is well known that the spots range themselves in two zones on either side of the solar equator, but I am not aware that anybody has made the same observation with respect to the faculæ; the zones of these, however, seem broader than those of the spots, but the width of the zone of one hemisphere rarely trenches on the other. The constancy of this disposition evidently proves that the faculæ constitute two continuous zones on each side of the equator, and not insolated groups, pretty nearly similar to the zones of the trade-winds on the terrestrial globe.

2. If, after having found the heliographic longitude and latitude of the spots, we reconstruct their distribution on the circumference of the solar equatorial zone, we shall not be slow in perceiving, that although particular spots and their groupings may be very variable, nevertheless, there are regions in which they reproduce themselves several times in succession, if not in the same place, at all events, in the immediate vicinity. This tends to prove their dependence on and connection with the accidents of the solar body itself. The more disturbed regions during the last six mouths have been in longitude 40°, 150°, 340°, reckoning from the solar miridian what passed through the centre of the disc at midday of the 17th Dec., 1858.

3. Last year I pointed out a method of finding the depth of the solar spots, founded on Wilson's theory: the results obtained then have been confirmed by measurements of several other spots, in such a way that the thickness of the photosphere does not exceed a third, or at the most a half of the radius of the terrestrial globe. The relatively small thickness of this layer will explain the facility with which it is rent.

I hope that the study of the sun, followed in this manner, will produce interesting results, analogous to those already discovered by Messrs. Carrington, Swabe, Sabine, and Wolff.—*Cosmos.*

EXHIBITION OF PHOTOGRAPHS AT ABERDEEN.

We are rejoiced to find that the exhibition of photographs has given so much satisfaction, and feel pleasure in reflecting that we may take some credit to ourselves for having assisted in bringing about so gratifying a result.

Among the more conspicuous of the prints exhibited are the photographs of Raffaelle's cartoons, by Caldesi and Montecchi—capital specimens of which, by the way, are to be seen at the South Kensington Museum.

If evidence were wantiug of the superior advantages of photography over engraving in copying works of art where fidelity is required, we need only refer to these prints. We question whether their beauties were ever appreciated before they were popularised by the firm above mentioned, even by those whose taste had been educated. Their large size prevented the eye from taking in their beauties so readily as can be done now that they are reduced to proportions so much smaller. We need not, however, offer any further remarks on them, a detailed notice having appeared in our columns so recently. The most interesting prints to the visitor are those which depict views of different places in the vicinity, which possibly he may not have time to visit; and we are hardly disposed to join in the onslaught made by a local art critic on some of these photographs because

they happen to contain representations of residences of individuals more or less well known. The generality of photographers, like their more pretentious brethren who use the brush, have to contribute their quota to the expenses of the State by means of what they earn, and if they find pictures of this class sell better than a representation of a group of ferns or a flock of sheep, it can scarcely be a matter of surprise that this class of photographs should be rather plentiful. The same slashing critic says of the portraits exhibited—"The public would not undergo the slightest loss were the countless delineations of crinoline and pegtops put where their originals should be—at the back of the fire. Let the photographer go to the green fields, and the woods, and the hills, for there he will find subjects worthy of his art. At present he is but too often misusing photography, and destroying the public taste by the choice of his subjects. True, in the proper sense of the word, he can never be an artist; he is, strictly speaking, but a mechanic." After such a strong expression of opinion it is rather surprising to find him speaking of the look of the old woman in M. Rejlander's picture of "Speed him well" as "a masterly stroke."

On walking round the room we see many pictures with which we are familiar, such, for instance, as "The Wayfarer," "Preparing to cross the Brook," some large photographs by Bisson, and others by Baldus; but there is also a good sprinkling of clever photographs by local celebrities, which have, to the majority of the visitors, the charm of novelty.

Dictionary of Photography.

Filtration.—This is one of the most frequent and important of the minor operations to be attended to in photography; and, since for its proper performance there are many things connected with it which require attention, we will enter somewhat at length into the various parts of the operation, including the substance through which the filtration is to be performed, the funnel and its proper shape, the support for the funnel, and the necessary precautions to be taken in order to ensure a successful result. Some of the minor details into which we shall enter may possibly seem of little consequence to a person merely engaged in the mechanical practice of photography; but as the interest which our readers are taking in our lessons on chemistry, shows that most of them are addicted to chemical pursuits, we think it better to enter into rather more detail, when treating of this important subject, so as to be of use to our chemical as well as photographic readers.

The most frequently used material through which filtration takes place, is fine white blotting paper. In chemical laboratories, there is a sort in use called *Swedish* filtering paper; this we strongly recommend for photographic as well as chemical purposes, the small amount of mineral constituents in it rendering it less likely to communicate any injurious property to the bath. If, however, the high price charged for this paper be considered an objection, an excellent quality of fine blotting paper of English make may be met with, and, by a few preliminary trials, a sample of paper may be picked out, which will for most purposes answer as well as the more expensive kind. The nature of the paper chosen is an important point. It should admit of the liquid running through it readily, and at the same time the filtrate should be perfectly clear and bright, notwithstanding the turbidity of the liquid in the funnel. A paper through which liquids pass slowly should be rejected, on account of the loss of time which would be caused by the slowness of the filtration and subsequent washings. The piece of paper through which filtration is effected, is called the *filter*, and it is usually cut of a circular form. Often in laboratories and other places where the operation of filtration is of frequent occurrence, there is a great waste of filter paper, owing to the habit which many persons have of tearing off from the sheet of paper a larger piece than is necessary, and then after folding it to the proper shape, of cutting off the superfluity; thus the remainder of the sheet of paper is of such a shape that comparatively few filters can be cut from it. The best manner of preventing this useless waste, is to cut beforehand a certain number of filters of different sizes by means of circular discs of cardboard—the sizes to be arranged so as to fit the funnels in most common use. By a little management with discs of different sizes, laid on an outspread quire of the paper, the filters can be cut so as to reduce the waste of paper to a minimum. This excess of paper should on no account be thrown away, as it will be found very useful for preparing pyroxline, if Swedish paper be employed; or for cleaning and drying dishes, glasses, &c., if a commoner sort be used. Filters when cut should be preserved for use in a drawer or case, in which each particular size has a compartment of its own, so that the required size may be taken at once without waste of time in seeking for it. When considerable quantities of liquid are to be filtered, such, for instance, as the accumulated silver residues of some months or years, and containing a considerable quantity of solid matter in suspension, the following plan should be adopted:—Take a piece of linen which has been previously well washed and rinsed in clean water, and nail it by the edges to a square wooden frame, so that the middle part may hang down and form a convenient receptacle for the liquid. Support the frame on a stand (two chairs will frequently make as useful a support as anything) and place underneath a jug or other vessel to receive the filtrate. The linen bag may now be filled with the liquid, and the filtration will proceed rapidly. If the filtrate be not quite clear in these large operations it is not usually a matter of much consequence, as it can easily be remedied by allowing it to clear by subsidence, or by filtering it a second time through paper. This kind of filter should be used especially for solutions which contain an excess of caustic alkali, as they are not so liable to be injured by it as paper filters would be. When the filtration is finished, and the solid matter removed, the linen should be immediately well washed, or it will be liable to rot, and thus be unfit for subsequent operations. In many operations a filter is employed made of woollen stuff, such as flannel or felt; the bag is then usually made of a long pointed shape. It is usually easy to filter liquids through felt, as the filtrate comes through clearly and rapidly. This kind of filter is of great use in filtering gelatinous solutions, which require to be kept hot, as the stand can be placed in front of a fire. When strong acids or corrosive liquids have to be filtered, it should be effected through clean sand or powdered glass, with which the lower part of the funnel is to be filled; having taken the precaution to place near the neck of the funnel some large pieces of glass, to prevent any of the finer pieces from falling through. The liquid to be filtered is to be poured on the coarsely-powdered glass, and it will, in most cases, be found to pass through clearly. It is evident that these latter methods of filtration are inapplicable when the precipitate is required to be collected carefully; in such cases the operator must be guided by the special circumstances of the case, as to which plan he adopts.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS. GLASS POSITIVES (*continued*).

The late Mr. Scott Archer, to whom the world is indebted, not only for the discovery of the collodion process, but for many valuable suggestions and improvements connected with the art, introduced a process for whitening positives after they have been developed and fixed; and this process, which had for some time been but little employed, has lately been re-introduced under the title of the "Alabastrine Process."

The formula for the whitening process is as follows:—

Bi-chloride of Mercury	2 drachms.
Water	4 ounces.

Dissolve by the addition of a moderate heat. When it is desired to whiten a picture, some of this solution should be placed in a porcelain dish—enough of it to cover the plate. The plate must then be immersed pretty quickly, in order to ensure its being uniform, and the film must be uppermost. Immediately after immersion the image will turn nearly black; by continuing the process, however, for a few minutes, it will soon become beautifully white, and I have found it an advantage to apply a gentle heat during the process, which may be carried on in the light.

After whitening, the plate must be thoroughly washed for a minute or two, or the mercury will crystallise upon the plate when dry. I do not advise drying the plate before the fire, as it is apt, not only to discolour the surface, but to cause myriads of small holes to appear all over the plate.

In using the bichloride of mercury (corrosive sublimate), the greatest care should be exercised, as it is a highly dangerous and poisonous substance; the bottle in which it is kept should be labelled "whitening solution—poison." The same solution may be used to whiten several positives.

As the brilliancy and delicacy of whitened positives depend much upon the fineness of the silver deposited upon the picture in the process of development, the following formula—which should be applied by pouring on, and not by immersion—may be substituted for the sulphate of iron developer:—

Pyrogallic acid	8 grains.
Nitric acid	4 drops.
Distilled water	4 ounces.

Dissolve the pyrogallic acid in the water, and then put four drops of nitric acid in the glass measure, which must be clean. Now pour the solution of pyrogallic acid into the measure and return it to the bottle; by thus doing you will be sure not to add too much acid, which would be injurious.

Vignetted Positives, if well done, are exceedingly artistic and beautiful. They may be obtained in the following manner:—Take a large piece of perfectly white cardboard, about 18 inches square; cut an oval aperture in the centre of this and about six inches deep; then cut a series of notches or vandykes all around the aperture, or gum some cotton-wool round its edge, to overlap about half an inch. When the gum is dry the wool may be pulled gently with the fingers until it forms a feathery edge. This vignetting board may be arranged on a stand and placed between the camera and the sitter, so that the latter, when viewed through the camera, may be exactly in the centre of the aperture. By this means the head and shoulders, or as much of the person as may be desired, can be taken upon the plate, the surrounding parts being white.

The time of exposure, when using the vignetting board, will be somewhat longer—probably at least double the time being required; however, a little practice will soon give the student the knowledge of the time of exposure necessary.

Collodion positives may be tinted with dry colours and pencils, sold at the photographic warehouses and at the artists' colourman's, expressly for this purpose. The colours should be applied thus:—Place a little of the colours to be employed upon a piece of paper, and the brush to be used for each colour must be kept separate. Dip the brush in the colour, and gently brush it over the part to be tinted. When too much colour has been applied, it may be removed by means of a long sable hair brush, or "duster," kept for that purpose. Some artists tint the pictures after they are varnished, but I have an objection to this, as, in the process of varnishing, minute particles of dust are apt to settle on the plate, each of which forms a nucleus, which causes the colour to attach itself in greater quantity upon the same, and gives the picture a coarse and irregular appearance. If the picture is tinted before varnishing, it must be done with gentleness, or the film may be scratched. When it is found difficult to lay sufficient colour upon certain parts of the drapery, it may be advantageous to breathe gently upon the plate, which will enable it to receive the colour more freely. This must not be done without great care, or the colour will clog and appear as if smeared. The picture may be varnished after colouring, which will not remove the colour.

In mounting positives, if they are not required to be coloured, a piece of black cloth or velvet is to be cut to nearly the size of the plate, upon which it is to be laid, film downwards. A "mat and preserver" may now be used to inclose the plate, which the student will readily manage. Or the picture may be placed in a "passe-partout"—a frame manufactured especially for this purpose.

Varnishing a positive somewhat destroys the whiteness of the picture, therefore it may be inclosed in the frame without being varnished; and if stout paper be gummed well over the back and edges, it will be sufficiently protected from atmospheric influence, especially if the picture has been whitened with bichloride of mercury, in which case it is not so liable to become tarnished. I have some positives by me which have been thus preserved for several years, without having undergone any change whatever.

Positives which have been tinted must be mounted with the film side uppermost, as the colour does not show through the reduced silver to any extent. In this case, when using a mat and preserver, an extra glass will be required to place in front of the picture. It is as well, also, to gum a piece of paper round the edges of the two glasses, in order to keep out the air and moisture. A solution of shellac, dissolved in spirit of wine, is a good thing for this purpose.

(*To be continued.*)

The Amateur Mechanic.

GLASS.

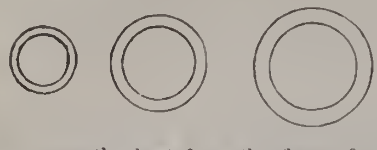
Perhaps no substance is of more universal application in the manufacture of chemical apparatus than glass, and although it can, for the most part, be purchased in the form in which it is required to be used, yet some knowledge of the methods of working it, especially as regards cutting, bending, drilling, blowing, joining, &c., is of great importance, if not absolutely necessary, to the scientific experimentalist. The acquisition of the requisite skill and experience is really not so difficult and formidable as it may at first appear to the entirely uninitiated; at the same time, the facility for manufacturing in the laboratory many of the simple articles, such as syphons, test tubes, pipettes, tube funnels, &c., which even the veriest tyro in chemical manipulations must often require, and the skill to convert some broken and useless vessel into another at once neat and useful, cannot be too highly estimated, and is, therefore, worth a little trouble in acquisition.

Bending glass tubes is one of the simplest processes in connection with glass working;* skill in the operation will, with a little care and practice, be easily acquired, if a right method be adopted. The selection of the tubes is a point of importance at the outset. The glass should be soft and easily fusible; but this is a point which need not trouble the beginner, as he will generally find that sold for the purpose of right quality. Many of our readers may find some difficulty in obtaining communication with glass works for the purpose of procuring tubing; they will generally find, however, that a stock of tubes of various sizes is kept by some operative chemist in their neighbourhood for his own use, and will probably supply them with sufficient for amateur purposes. The cost, under such circumstances, is about twopence per ounce,† and a rod a yard long, and five-sixteenths of an inch thick—a good size for many purposes—will weigh not more than an ounce and a half. The chief point in selecting requiring attention is to see that the thickness of the glass is of sufficient proportion to the diameter of the tube; unless this be the case, the difficulties of working will be materially increased. If the tube be too thin, it is apt to collapse when sufficiently melted to bend, or if this be avoided the curve is generally irregular and imperfect, and, consequently, very liable to break. Thin tubes, moreover, will

* We may here remark that we shall not feel it imperative to detail simply our own practical experience in manipulations of various kinds; but whilst giving the preference to methods we have personally found best, we shall not hesitate to avail ourselves of the aid of good authorities. Some of those to whose pages we may be indebted are—Faraday, Griffin, Greville Williams, Mohr and Redwood, Gray, Francis, Partington, Martin, Smeaton, Nicholson, &c. As, however, the suggestions from these authors will generally be in modified and combined forms, it would be impossible to make any specific references. This general acknowledgment of indebtedness will, therefore, we hope, be sufficient.

† This is in London. In the country it will probably be more to cover carriage, and risk of breakage.

rarely bear the pressure of a cork pushed in sufficiently tight, without cracking. The following proportions will be found suitable for working, and convenient in use:—A tube a third of an inch in diameter, should be about the twenty-fourth part of an inch thick; a tube half an inch in diameter, should not be less than one-sixteenth of an inch in thickness; tubes five-eighths of an inch in diameter, should be about one-twelfth of an inch in thickness. They will present transverse sections, something like the following:—



For most purposes, the heat from the flame of a good sized spirit lamp will be sufficient; but where it is accessible, gas is much preferable. If gas be used, a very large flame is not necessary; the ordinary fish-tail burner, about half turned on, we find gives a steady pure flame and great heat. If there be a full pressure of gas, the combustion is generally imperfect, the flame flickering and unsteady, and the heat not proportioned to the size of the flame.

The tube may be easily cut into the necessary lengths for any purpose required; the smaller tubes are divided by notching them at the point to be divided with the edge of a file, and then using gentle force to break them, in the same manner as breaking a stick which has been notched to weaken it. Larger tubes are difficult to cut in this manner, and must be divided by other methods, which we shall describe in due course.

Before commencing to heat the tube, it is better to mark the point intended for the centre of the curve with a piece of chalk, as a guide for the eye in heating the glass. The portion to be bent should then be introduced to the flame, cautiously at first, so as to warm it gradually, giving it a rotatory motion on its own axis with the finger and thumb, so as to equalise the heat all round. If the curve be intended to be sharp, about an inch of the tube, if it be a small one, or a little more if it be large, is to be heated until it is softened; it is then removed from the flame, and being held by the two ends, which are to be gently pressed together, taking care to make them approach each other exactly parallel, and not each diverging laterally from the point of curvature.

It is a point of some importance to keep the tube in the right part of the flame, as not only is the greatest heat so obtained, but the deposit of soot on the glass is avoided. The tube should be brought in contact with the extreme top of the yellow visible flame, across its edge, moving the tube backwards and forwards to bring the space required to be softened into contact with the flame. A little experience will enable the operator to detect the first symptoms of softening, after which the sooner the curve is effected, the more perfect it is likely to be, as it is difficult to effect a neat curve if the glass be too much softened.

(To be continued.)

Photographic Chemistry.

CHEMICAL NOTATION: SYMBOLS—(*continued*).

The chemical formulæ of *binary* combinations are written by placing the symbols of each of the elementary bodies which enter into the compound one after the other, the symbol of the *base* being always placed first. The mere juxtaposition of the symbols, without the sign of addition, expresses the combination between bodies in the ratio of their equivalents, thus:—H O water, H Cl hydrochloric acid, Fe O protoxide of iron. Sometimes, however, the sign of addition is used with the symbol, thus:—H+O, H+Cl, Fe+O. When it is desired to indicate a compound formed of several equivalents of one substance to a lesser number of equivalents of another, it is necessary to add the figure expressing the number of these equivalents to the symbol. This is generally done by placing the figure to the right of the symbol and a little below the line; it is, however, sometimes placed above the line, and sometimes on the same line in advance of the symbol, as will be seen in the following example: S+3O or $S\ O^3$ or $S\ O_3$ are merely different ways of indicating sulphuric acid; the last being that most commonly adopted, and to which we shall adhere.

To indicate combination between *compound* bodies the sign of addition, or a comma, is used; for example, sulphate of soda is thus written: $Na\ O+S\ O_3$ or $Na\ O,\ S\ O_3$. A number standing before symbols inclosed within a bracket signifies that the whole of the latter are to be multiplied by that number; when the bracket is omitted, the number affects all the symbols between itself and the next sign. The amount Mn_2O_3 (sesquioxide of manganese) forms a neutral sulphate with an amount of sulphuric acid, represented by three times $S\ O_3$; the formula of this salt will be written thus: $Mn_2O_3,\ 3S\ O_3$. The formula $Pb\ O,\ N\ O_5$ represents the neutral nitrate of lead, and the formula $2Pb\ O,\ N\ O_5$ represents a basic nitrate of lead, which contains, for the same amount of nitric acid, a double amount of oxide of lead. The former formula representing a certain weight of neutral nitrate of lead, to indicate a double quantity of this nitrate, it may be written in this form, $2(Pb\ O,\ N\ O_5)$.

OF THE DIVISION OF SIMPLE BODIES INTO METALLOIDS AND METALS.

There is a general agreement among chemists to divide simple bodies into *metalloids* and *metals*; but it is somewhat difficult to state with precision the characters on which this division is founded. Metals are opaque, and possess a peculiar brightness, termed *metallic lustre.* They are good conductors of heat and electricity, which properties the metalloids do not possess in the same degree. This method of division is founded on properties which are not absolute, and which are more or less developed in the different elementary bodies. There are bodies which might, as regards their qualities, be classed with either the one or the other; as arsenic, for example, which, in its chemical properties, approaches so closely to phosphorus, that many chemists include it among the metalloids, although it possesses the distinguishing characteristic of metals, metallic lustre, to quite as great an extent as many of the recognised metals. Carbon, again, assumes different appearances; in some cases it presents none of the appearances of metals, and is a very bad conductor of heat and electricity. In other cases, on the contrary, as in the instance of graphite, it possesses metallic lustre to a considerable extent, and is a very good conductor of electricity. Good conductors of heat and electricity are to be found only among those metals which possess the qualities of fusibility, ductility, and malleability in high perfection; those metals which have only been obtained in a pulverulent state being very indifferent conductors.

In the binary combinations which metals form with metalloids *the latter always act as the electro-negative element.* Both metals and metalloids combine with oxygen; the combinations of the former with oxygen are almost always *electro-positive oxides*, which act as *bases;* these generally contain the smallest proportion of oxygen. Some of them which contain a larger proportion act as *indifferent oxides*, and those which contain the largest proportion are not unfrequently *acids*, which form true salts with basic oxides.

The metalloids, in combining with oxygen, generally form *indifferent oxides*, or *acid combinations*. Still, some of these combinations behave as bases—very feeble certainly, in relation to strong acids. These same combinations act as weak acids with energetic bases. It will be seen, therefore, how narrow the line is which separates the metals from the metalloids. It is with these latter that we will commence our consideration of the elementary bodies, and the combinations they form with each other; only excepting from this rule the numerous combinations of carbon with certain gaseous substances, which may, from their complex character, be better understood when the reader is more advanced.

(To be continued.)

South London Photographic Society.—Members are reminded that the first meeting for the ensuing session will be held in the large room adjoining the Lecture Hall, Carter-street, Walworth, on Thursday, the 20th inst., when gentlemen desirous of joining are requested to attend. Letters, requesting information respecting the exhibition of apparatus, reading of papers, or terms of admission, to be addressed to the secretary, Mr. A. Wall, 11, The Terrace, Walworth, S.

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 4th October, 1859.

One of the prettiest and most interesting chemical transformations is certainly that in which pure white cotton is transformed into a substance, soluble in a mixture of ether and alcohol, to produce collodion. The following is the description of the preparation of photographic collodion as it is given in the work published a few weeks ago by M. Robiquet—a work which I mentioned in one of my former letters:—

"Cotton, linen, paper, starch, and, in general, all organic substances presenting the composition $C_{12} H_{11} O_{11}$, which is that of cellulose, are susceptible of combining, by substitution, with nitric (hypo-nitric) acid, producing certain explosive compounds, to which the denominations of fulminating cotton, gun-cotton, nitric cotton, pyroxyle, fulminating linen, pyroxone, &c. &c., have been given.

"The process by which these substances are formed differ very much, according as to whether one wishes to obtain a detonating substance, sparingly soluble in alcoholised ether, or a product which burns slowly, like tinder, and which is, on the contrary, very soluble in the mixture of alcohol and ether. The latter alone will occupy us here.

"The gun-cotton of photographers is of a brilliant white, and dissolves easily in ether, to which a certain volume of alcohol has been added: when lighted, it fuses rather than detonates, transforming itself into oxide of carbon, carbonic acid, nitrogen, and aqueous vapour. To prepare it, the following ingredients are required:—

Commercial sulphuric acid	3,200 parts.
Dry nitrate of potash	2,000 ,,
Combed cotton	150 to 175 ,,

The nitrate of potash is roughly powdered, and dissolved, at a moderate heat, in the sulphuric acid, care being taken not to drive off much nitrous vapour. As soon as the whole is liquid, it is poured into a large porcelain capsule, covered with a glass, and its temperature is noted from time to time. When the thermometer shows that the mixture has attained the temperature of 30° (centigrade) by cooling, the cotton is introduced in small quantities at a time, and the liquid is stirred with a glass spatula until all the cotton has been added; the capsule is then covered over again with the glass, and the whole allowed to remain quiet until the next day. The contents of the basin are then thrown into a bucket of cold water; the gun-cotton is separated as much as possible from the saline matter that adheres to it, and it is afterwards well washed with boiling water, until the washings present no acid reaction with the litmus paper. The cotton is then withdrawn, pressed, and dried at a temperature of 25° or 30° (centigrade).

"Gun-cotton, well prepared, is soluble, without residue, in alcoholised ether, and gives nothing to pure water."

Chloroform, as is well known, sometimes contains chloride of elayle, alcohol, hydrochloric acid, or some of its compounds, compounds of amyle and methyle, or aldehyle, &c.

M. Berthe has made known some reactions, by which it is easy to ascertain the purity of this substance. After observing that it is indispensable that chloroform, when used in photography, should be perfectly pure, he informs us, that if potash be added to chloroform that contains chloride of elayle, this compound is transformed into chloride of acetyle, which is easily recognised by its very disagreeable odour.

To recognise the presence of any of the other compounds above-named, a small quantity of bichromate of potash is pounded down in a little chloroform, and a few drops of sulphuric acid are added. If the chloroform is pure, a red precipitate of chromic acid is obtained; under contrary circumstances, this chromic acid is reduced to oxide of chrome, and the liquid takes a green colour.

In a memoir, lately presented to the Academy of Sciences at Berlin, the celebrated Professor Dove has proved that the sounds known as *Tartini's sounds* are not *subjective*, but *objective*. In a former paper, read before the same Academy as early as 1827, M. Dove described some experiments, from which it resulted that when the ear has perceived for some time a sound of a certain intensity, it becomes less impressionable by this sound than the other ear which has not been allowed to hear it; so that when this same sound arrives simultaneously at the two ears, it is only perceived at first by that ear which has not heard it before.

In this respect the ear seems to behave towards sound as the eye towards colour. As stereoscopic phenomena show us how luminous impressions producing different images in the two eyes can be combined, M. Dove thought it would be interesting to ascertain if like phenomena do not exist also for the ear,—that is to say, whether different states of excitation produced in the two ears cannot combine and transmit to the brain a single impression resulting from these multiple impressions. Experiment has shown that this is not the case. Two diapasons, each giving a pure *quinte*, were placed one before each ear. Tartini's sounds, or the bass octave resulting from the combination of these two systems of vibration, were not heard; on the contrary, this octave was distinctly heard when the two diapasons were placed before one ear. The author concludes from this that the *accords* known as "Tartini's sounds" are objective, and not subjective, as was hitherto supposed.

M. Auguste de la Rive, the distinguished physicist of Geneva, has addressed to the President of the Academy of Sciences, at Paris, a most interesting letter on the aurora borealis, which surprised a great part of Europe on the 29th August last. I mentioned in one of my former letters that M. Coulvier Gravier had given a full account of this phenomena to the Paris Academy. M. de la Rive finds in this and other accounts a direct confirmation of a theory which he published for the first time in 1849, and which has found its proper place in his admirable *Traité d'Electricité*. This theory, which is probably the best that has yet been imagined to explain the phenomenon of the aurora borealis, supposes that the vapour which constantly rises from the ocean, and especially from the intertropical seas, carries up with it into the higher regions of the atmosphere a considerable quantity of positive electricity, leaving the solid portion of the globe charged with negative fluid. The existence of this positive electricity in the air is a fact proved by experiment. These vapours, charged with positive electricity, are driven towards the north and south poles by the trade winds, which constantly blow in these directions in the higher regions of the atmosphere, carry with them their positive electricity, and produce in the whole atmosphere an electro-positive condition which diminishes, as we proceed, from the higher to the lower regions. There is a constant tendency existing between the negative electricity of the earth and the positive electricity of the atmosphere, to neutralise each other; this tendency is clearly demonstrated by our physical instruments.

This neutralisation takes place in two manners: either directly through the layer of atmosphere itself, or at the two poles of the earth. In the former case the neutralisation is more or less active, according to the degree of humidity in the air; it manifests itself in storms, and in lightning.

The second case, which is the normal mode of neutralisation, constitutes the aurora borealis. It takes place near the poles, whither the vapours and electrified air are carried by the trade winds and condensed. These aurora are generally visible only at or near the north and south poles.

The aurora borealis is therefore nothing more nor less than an electrical discharge, resulting in the neutralisation of electricity, which is intense enough to become luminous. The aurora of the 29th of August is remarkable, from the rarity of so considerable an apparition at such a comparatively early period of the year. It was the natural conse-

quence of an exceptional dryness which has reigned this summer in the whole of Europe. The absence of sufficient moisture in the air has prevented the neutralisation of electricity taking place in our part of the world by storms, &c., and the result has been that a discharge has taken place at the north pole, and produced the magnificent phenomenon of which I speak in this letter.

A considerable number of papers have been addressed to the Paris Academy of Sciences, within the last month, upon the disinfecting and deodorising effects of a mixture of plaster of Paris and coal-tar. The sulphate of lime or gypsum in this mixture may be replaced by marl, or any other porous earth. It appears that these precious qualities belong to the coal-tar. To explain the disinfecting and deodorising properties of the latter substance, M. Dumas, relying upon the numerous experiments of MM. Schönbein, Kuhlmann, and Phipson, supposes that the emanations from the tar have the faculty of ozonising the air, and thus destroying miasma. It is a well-known fact, which has been lately proved anew by M. Burdel, that ozone and putrid miasma cannot exist at the same time, and that, when the supply of ozone is sufficient, no miasma can be developed. Now, some years ago, MM. Schönbein and Kuhlmann showed that essence of turpentine had a peculiar action upon oxygen, which it transformed rapidly into ozone, especially with the assistance of light. Since then, M. Phipson has extended these experiments to a great number of other essences or essential oils, all of which have the faculty of transforming atmospheric oxygen into ozone. If a small quantity of any essence, such as the essential oil of bitter almonds, or of carraway, &c., be placed at the bottom of a large flask imperfectly corked, and a strip of litmus paper, together with a strip of ozonoscopic paper (paper to which a mixture of starch and iodide of potassium has been added), be suspended in this flask, the former will, in the course of a day or two, be completely discoloured or bleached by the ozone produced, whilst the iodide paper will be seen to turn red from a certain quantity of iodine becoming free, and will take a dark blue tint when plunged into water.

Thus we can judge, with a certain degree of accuracy, as to the healthiness of any locality by the degree of ozone existing in the air. Where putrid miasma are present ozone disappears; where ozone is plentiful, putrid miasma cannot exist.

According to a short paper by M. Burdel, the mixture of coal-tar and earth occasions an apparition of ozone in places where before putrid emanations existed in abundance, and he is about to undertake a series of experiments on a large scale, with the view of applying to public health the discoveries alluded to above.

The well-known mineralogist, Professor Haidinger, director of the Imperial Institute of Vienna, has been presented by the Emperor of Austria with the title of Court Counsellor (*Hof-rath*—a very high distinction in the Austrian official sphere), "on account of his able direction of the Imperial Geological Institute." I intend to give you soon the substance of a paper published some time ago by this distinguished *savant*, on the colours of natural bodies.

THROUGH JAPAN WITH A CAMERA.

(From our own Correspondent.)

Nangasaki, 6th July, 1859.

Honoured Sir,—Having had the pleasure of spending an evening at your Society in London some four or five years ago, where I had the advantage of hearing a paper read by you on some observations you had made on polarised light, a subject in which I took a lively interest, I have the more pleasure now in acceding to your wish in sending for publication in your Journal a copy of portions of the diary which I have since kept; and as much of it refers to a country in which I have resided a considerable time, and one of which few of your readers know anything, I think it will be read with some interest.

The country I allude to is Japan; and I confess that I have been greatly surprised by some statements respecting it which I have read both in English and French newspapers, which prove nothing so much as the absurdity of drawing conclusions respecting a people from what meets the eye during a ride or a walk through its streets or bazaars. My own acquaintance with this people dates from a period subsequent to my visit to your Society, referred to above, and has now extended over a residence of two years and three months at Nangasaki and other places. The facilities which I have had for moving about from place to place in the interior of Japan, I derived from a circumstance that occurred shortly after my arrival, and while engaged in taking photographs of sundry groups of individuals, both Dutch and Japanese, at one of the numerous gardens in Nangasaki. I was surrounded by a curious group of Japanese of both sexes, among whom was one intelligent elderly gentleman, who took a great interest in what I was doing, and who showed by his remarks that he had some knowledge of photography. His remarks were made in Dutch, which he spoke pretty fluently, and with a correctness of accent which I, a Norwegian, who had spoken Dutch habitually for years, could not surpass. As he was very polite in his manner, and very unobtrusive, I willingly undertook to answer all his questions provided he would wait until I had finished the work in which I was engaged, and would explain to the particular group I wanted to photograph that to enable me to take a picture it was necessary that they should remain perfectly still; and that the passing of young women with trays of tea and sweetmeats between me and the sitters was calculated to have an objectionable influence on the result. He acceded to my request very cheerfully, and chiefly through his assistance I was able to cover seven or eight plates, of which, however, the less said the better, a long sea voyage not being calculated to improve the qualities of any collodion, no matter how eminent the maker may be.

After I had ended my work we sat down together to drink a cup of tea, and impart mutual information. At first he confined his questions to photography and similar subjects; but after a time he began to question me as to my motives in coming to Japan, with a directness which would not admit of an evasive reply; moreover, I had no motive for concealing the object I had in view. This conversation ultimately led to my accepting the post of secretary which he offered me, on the understanding that I should be at liberty to practise photography whenever and wherever I saw fit. This condition he agreed to so readily, that I saw at once that the proposition he had made me arose mainly out of his desire to learn the art himself.

My employer was named Dsetjuma. He was both an official and a merchant, and it was in connection with the latter occupation that I was calculated to be of most service to him; the small knowledge I possessed of the Japanese tongue at that time, and my almost total ignorance of the laws and customs of the country, rendered me of little use to him in his official capacity. It must not be supposed that all this was done in one evening. There were inquiries to be made by both of us before this could be accomplished; and being an official, he had to obtain the sanction of a superior functionary before he could venture to conclude an arrangement with me, a foreigner, who might be capable of betraying official secrets to my government, which they naturally imagined was the Dutch one. At last everything was settled; my camera and other photographic impedimenta were carefully packed up; also my European clothes, which I resolved on wearing no more while in Japan, and in the evening of a most miserably wet day I put myself into a species of sedan chair, and my luggage into another, and was carried off to Dsetjuma's house; which I entered to all outward seeming a Japanese.

I must confess I did not feel very happy on arriving. There was no familiar face to look at—even my employer was absent; and as I sat on the mat, in the attitude of the

natives, and trying to look as if I were used to it, I felt very much disposed to get up and go back to my old lodgings, and resign all hope of becoming more intimately acquainted with the *vie intime*—the domestic manners and customs of the natives—than is possible to any resident in Nangasaki who chooses to keep his eyes open. No doubt this depression arose in a great measure from my having been shut up so long in what was little better than a box, with scarcely any ventilation, from the necessity of keeping it closed owing to the wet, and so being compelled to breathe an atmosphere composed principally of carbonic acid gas. I would recommend anybody who may have a strong presentiment that some evil is going to happen to him, to reflect before suffering the feeling to overcome him, whether he may not have been somewhere where he was subjected to the necessity of breathing a poisonous atmosphere; for I think I may safely affirm that it would be difficult for anybody to feel more strongly than I did at that moment that the "darkness of desolation was about me, and the shadow of darkness on my path;" and yet, a night's sleep was sufficient, with a cold bath on getting up in the morning, to make me myself again, and the melancholy of the previous evening had completely vanished.

I found on entering the room into which I had been shown on the previous night, that breakfast was already prepared, and my employer waiting to receive me; which he did with the cordiality which is the characteristic of all men of mark in Japan, when they are not restrained by official considerations. I was too hungry to inquire very curiously into the nature of the contents of the different dishes of cooked meat; besides, I had made up my mind to conform to the customs of the country in all things, small and great, as being the likeliest way of acquiring correct information, and getting rid of any prejudices I might entertain; so I ate unhesitatingly of them all, although not without certain qualms when suggestions of worms and snails occurred to my mind. However, by dint of taking plenty of exercise, and so getting exceedingly hungry, I soon managed to get rid of this little remnant of fastidiousness, which is not so difficult to accomplish as many people may imagine.

Dsetjuma's house was built pretty much in the same style, and of the same size, as the generality of those belonging to men of his rank in that part of Japan, but it had certain natural advantages attached to it, which the generality of the houses had not. The garden was intersected by a pretty little stream, as clear as crystal; and at one part of it a basin had been made of white marble, through which the rivulet took its course with a gentle murmur and a ripple most delightful to hear on a hot day. Over this stream was built a large summer-house, the floor of which was only a few inches above the level of the stream. The sides were formed of panels made of semicircular pieces of bamboo, so contrived that on touching a knob a spring was released, and the panel rolled itself round one of the pillars which supported the roof. By this contrivance a panel could be closed or opened anywhere in an instant, according to the position of the sun or the direction of the wind. It was in this summer-house that Dsetjuma spent very much of his time, either smoking and watching the ladies of his household disporting themselves in the water like so many sirens, or in writing official reports and letters. Artificial rocks and grottoes were scattered here and there, which were formed of large rough pieces of slag, a material which is very well adapted for the purpose, from its never showing signs of being affected by exposure to moisture. Growing from openings in these heaps of slag were stunted shrubs, which had the appearance of aged trees, gilliflowers, geraniums, tulips, lilies, and many other flowers with which you are familiar in Europe, but larger and far more brilliant in colour than any I have seen in Holland, with the exception perhaps of the tulips. Far surpassing the flowers I have enumerated, both in size and generally in beauty, were numerous flowers which I never saw out of Japan, the names of which it would be of no use to specify, even if you could spare the space, as I do not believe they could be acclimatised in Europe, their beauty appearing to depend on the peculiar manner in which the Japanese cultivate them, and the nature of the soil in which they are grown, as well as the manure with which they are supplied, always in solution. The gardeners of Japan cannot be excelled anywhere in the world. I have watched those employed in the garden I am describing, and it was a study to see their earnest faces as they examined the development of a flower. Flowers seemed to be their passion; and, though I rose directly it was light, in order that I might get a bath before anybody was stirring, I was sure to find them in the garden, where they as regularly remained until it was dark—not because they were obliged to do so, but because they took a pleasure in their business. The consequence of this feeling has been the production of the most beautiful flowers from originals scarcely worth looking at. The paths, at least most of them, are shaded with creeping plants, covered with a profusion of flowers of the most varied colours, and arranged with exquisite harmony. These plants are trained over a light bamboo framework, which is completely hidden by them. At the verge of the garden are two grottoes; the interior of which is capacious, and contains only some mats on a raised framework, and a collection of pipes, with a goodly supply of tobacco, which is kept here that it may retain its moisture and flavour. The entrance to these grottoes is on the side opposite to the daily course of the sun, so that the most delicious coolness prevails in them on the hottest day, a coolness maintained by frequent irrigation of the flowers and plants which grow on their exteriors,—the narrowness of the entrance assisting in maintaining this low temperature, though it has the disadvantage of at the same time excluding light. The drawback to the enjoyment of sitting in one of these grottoes consists in the number of insects which take refuge in them in spite of the constant fumigation they undergo; one of these especially, a species of beetle, about an inch long, with bright scarlet wings, and alternate stripes of green and yellow along the back, appears to enjoy the smoke, and no sooner does one light a pipe than they invariably show themselves. This would be rather agreeable than otherwise, owing to their beautiful colours, were it not that their attachment for the smoke extends to the smoker, and they crawl up your clothes and along your back in the most uncomfortable manner. Indeed, their tastes are peculiar: I one day took down a jar containing cyanide of potassium, which I had inadvertently left uncovered, and found it nearly filled with them.

The freshness of the flowers and grass is preserved by copious irrigation. This is accomplished by means of pumps and hose; one pump being connected with hose to supply the reservoir of a second pump, which projects the water along the hose to which the tube is attached from which the water is directed. This tube is flattened at the end and perforated with holes to break the jet of water into numerous little streams.

The hose they use is extremely flexible, and in this respect is incomparably superior to that made of leather or gutta percha, which is used in Europe. I don't know the name of the tree from whence they derive the gum which they use in making it; but in answer to an inquiry I made of one of the gardeners, I was told that it was obtained from a tree similar to one he pointed out, which was a kind of cypress. What I have said of the garden will be sufficient to give your readers some idea of what a gentleman's garden in Japan is like, for though all have not the same natural advantages as that which I have described, they all resemble it in their general arrangement.

Very shortly after taking up my quarters in Dsetjuma's house, I found that if my chemicals were to be of use to me, they must be removed to some cooler place than the house afforded; consequently I proposed that one of the grottoes should be given up to me for the purpose of being used as a dark room. To this he readily agreed, and after a few

shelves had been fitted, I took possession; and a very commodious dark room I found it, and particularly agreeable to work in in the intensely hot weather. It is true, that there was still the drawback of the beetles and other insects; who once ate the collodion film off a whole batch of plates which I had put to dry; but as I took care not to give them the opportunity a second time, this was not of much consequence.

(*To be continued.*)

Miscellaneous.

Engraving without an Engraver.—Under the above heading, our talented contemporary the *Literary Gazette* of last week, has made the following apposite remarks on the new specimens of the photoglyphic art which were recently presented to our subscribers:—One of the most curious of the many remarkable applications of photography is that of producing by its means copies of engravings and other works of art. The almost perfect reproduction of a drawing or an engraving, without the intervention of an engraver or copyist, would have seemed a few years back almost an impossible thing—yet we know that photography accomplishes it daily. But we have become so familiar with photography that we almost cease to wonder at its marvellous doings. Still the reproduction, true and beautiful as it is, is a photograph and not an engraving. We have now to introduce to the notice of our readers a new process by which it has been found possible without even the aid of photography, in fact as we may say by mere mechanical means, to make a perfect facsimile of an engraving—whether a copperplate or a woodcut—and not only to make a copy of it, but to produce a plate or block for surface-printing, that shall yield impressions by the ordinary printing presses quite equal to the original. But even this is not all. Blocks can by this process be produced without the aid of any engraver, which shall print these facsimiles enlarged or reduced to any extent that may be desired. We have, for instance, seen a whole-page wood-cut from the *Illustrated News*, reduced to half, and enlarged to double the original dimensions, without any loss of sharpness or vigour, and without the smallest distortion being anywhere discoverable, even with a lens. So again with an old and imperfect map; and so with an impression from a steel engraving. But it is equally applicable to original designs made with a peculiar ink and paper. Without the assistance of an engraver, blocks for surface printing can be prepared from them, either of the same or any larger or smaller size. But further, the blocks for printing can be produced of an altered form as well as a different size. Thus the normal pattern for printing on a dinner-service can be reproduced, say in its original size and round form for the ordinary dinner-plates, half, or any other proportion of the size, for desserts or cheese-plates, and twice the size and oval for dishes, &c. All this, we have said, is a mechanical process, but it is also a scientific one, and to be properly worked out we need hardly say, it will require artistic guidance. The textile and the ceramic manufacturer are almost equally interested in this invention with the publisher, but the range of its application seems to be commercially almost unlimited. The process is carried through by means of elastic blocks and electro-metallurgy: all that is required to be furnished the manipulator is an impression of the plate to be copied. The inventor is Mr. H. G. Collins, who has protected his invention by patents. A company called the Electro Printing-Block Company, has been formed for working it. That the invention is regarded by business men as thoroughly practical, may, we suppose, be taken for granted, since the names of some of our leading publishers of illustrated works and ceramic manufacturers are in the list of directors. When the scheme is more thoroughly in working order we may return to the subject, to notice the process itself somewhat more particularly. Another process for engraving without an engraver, of which we gave a description some months back, also claims a word of passing notice. The "Photographic News" of last week presented its subscribers with a new plate, engraved by Mr. Fox Talbot's photoglyphic process. This engraving, a view of the Tuileries, is not only much larger, but much clearer and more effective than those previously given in the "Photographic News,' or shown at the rooms of the Photographic Society. So far it is a proof that the sun is making progress in the engraver's art. The copper-plate, after it left Mr. Talbot's hands was "steel-faced," and the sharpness and delicacy of the sculpture on the front of the building, and the various architectural details, prove as well the value of this auxiliary as the refinement and power of the photoglyphic process. Perhaps this steel-facing may in a great measure remove the difficulty of printing from a plate so slightly bitten-in a sufficient number of impressions to render the process commercially successful. If so, the chief point now is to secure greater firmness and transparency in the shadows. Should the remaining mechanical difficulties be overcome, we shall at length have undoubtedly permanent photographs of every class of objects obtainable at a moderate price. At any rate, if the art be carried no further—and it is inconceivable that, having so rapidly advanced thus far, it should halt where it is—Mr. Talbot will have solved the problem of producing photographic engravings, or, as we should prefer to call them, photographic etchings, entirely without assistance from the engraver.

A Flanders contemporary gives the following on the subject of hydrochloric acid, a chemical agent well known to photographers, but who may not be so familiar with its properties as the contemporary alluded to above:—"Professor Kletzinski, in the course of his experiments with this substance, found that the skin exhaled from 27 to 80 per cent. more of carbonic acid, and from 7 to 12 per cent. more of water, when in contact with this acid, in as highly concentrated a state as the skin would allow, without being injured, or when mixed with glycerine to weaken the local action. It cures and even prevents all cyanosique condition of the hands, whether caused by cold, chilblains, or chemical manipulations; it stimulates the local circulation, re-establishes and harmonises the momentarily disturbed functions of the skin, and a prolonged use of it will dry hands subject to moisture from perspiration. By its stimulating properties it drives away spots and pimples from the skin without injuring it. It is found to render the skin supple and of a closer texture, better able to resist injurious influences. The hydrochloric acid ought to be pure, exempt from iron and free chlorine, and as concentrated as the part of the skin to which it is applied will bear; it may sometimes be used in a fuming state. After a time varying according to circumstances, from a quarter of a minute to a minute; the part must be washed with water, and afterwards with soap. The action of the concentrated acid is borne longest by the hands, not so long by the feet, and still less by the skin of the forehead."

Detection of a New Planet by means of Photography.—To discover whether there are, as many maintain, small planets nearer the sun than Mercury, the method suggested by Sir John Herschel appears to us the only one calculated to be successful. He proposed that several observatories, in suitable situations, should be selected, and several photographs of the solar disk taken each day, by which means the changes in the appearance of the disk might be followed from hour to hour; and it is not likely that the passage of any little circumsolar planet would escape detection under those circumstances. M. Faye, of the Paris observatory, is confident that if this plan be adopted, and two images taken on the same plate with an interval of two minutes between, and the same again in a quarter of an hour, it would only be necessary to lay these negatives one on the other, and examine them by transmitted light, to discern in an instant the mobile projection of an asteroid in the midst of the most complicated group of small solar spots. We would suggest that these two images should be examined in the stereoscope, as by that means a difference in the position of a planet, which would be too slight to arrest attention by M. Faye's method, would, in the stereoscope, throw it far in advance of the accompanying group of spots, and we should thus see the little stranger rolling through space some thousands of miles in front of its paternal orb.

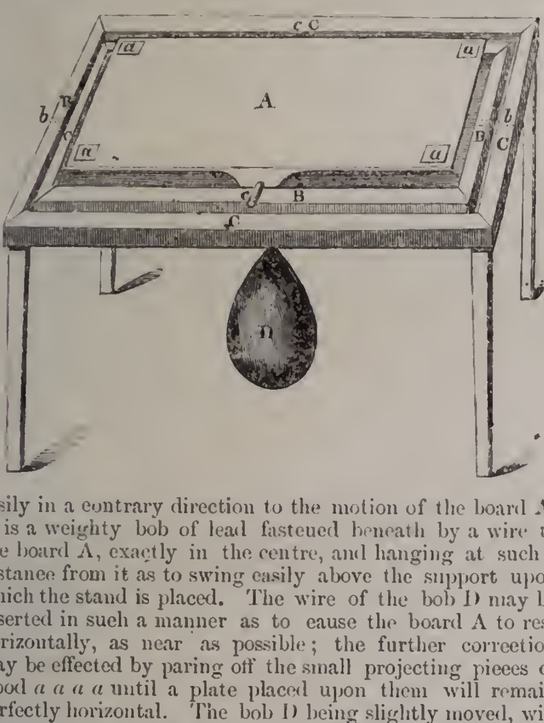
Our Photoglyphic Engraving of the Tuileries.—"Our contemporary, the 'Photographic News'—which, as a photographic organ, is unrivalled—last week presented its readers with a fine *engraving* of the Tuileries, produced by a 'photoglyphic' process, which is quite unique, and deserves to be brought prominently before our readers as an illustration of the manner in which the chemical and the mechanical arts are coalescing, as well as for other reasons. . . . . . . The picture represents a portion of the Palace of the Tuileries; and

from the richness of the sculpture, the number of the statues, and the numerous fluted columns, is an exceedingly difficult subject to engrave by a chemical process, owing to the great variety of tints it presents. We may therefore point to this photoglyph with confidence, as a proof of the great value of Mr. Talbot's process."—*Mechanic's Magazine.*

Photographic Notes and Queries.

SELF-ADJUSTING DEVELOPING STAND.

Sir,—Agreeably to my promise, I have sent you a rough sketch of a self-adjusting stand that I contrived for my own use, and have found it very useful indeed. I could have wished the perspective to have been a little more accurate, but trust you will be able to understand the action of the apparatus. A a thin board with raised centre underneath, into which the two pins C C are thrust; these pins turn easily in or upon B B. The board A is a little smaller than a stereoscopic plate, and can swing easily in the frame B B B. The frame B B B is supported by the pins *b b* in the frame C C C C in such a manner that it can swing



easily in a contrary direction to the motion of the board A. D is a weighty bob of lead fastened beneath by a wire to the board A, exactly in the centre, and hanging at such a distance from it as to swing easily above the support upon which the stand is placed. The wire of the bob D may be inserted in such a manner as to cause the board A to rest horizontally, as near as possible; the further correction may be effected by paring off the small projecting pieces of wood *a a a a* until a plate placed upon them will remain perfectly horizontal. The bob D being slightly moved, will keep the developer in motion for some time without further attention. W. R. Hurst.

CONVERTING POSITIVES INTO NEGATIVES.

Sir,—As it may be of some service to "One in a Fix," if I give him the result of my experience in converting positives into negatives, perhaps you will allow me to tell him that a picture treated in the manner in question does not require any fixing; what is called fixing being merely the removal of the unchanged iodide of silver, which has been (or ought to have been) completely removed before.

I have employed a method, somewhat similar to that described by Mr. Fowler, in all cases, whenever I have wanted a negative, for more than twelve months, and find the advantages so many, and the disadvantages so "conspicuous by their absence," that I never think of resorting to the old method.

The only objections I have ever seen urged against obtaining a negative from a positive are—want of half tone, and, as in the case of "One in a Fix," washing off the film; this last fault I am never troubled with, but believe it to be due to the kind of collodion used. The most important objection I am not in a position to speak on with so much certainty, as it is very seldom I have a chance of comparing another picture with mine, but I send you by the this post a few specimens of the process, in order that you may judge for yourself. The stereogram of Mere Church you will observe is a little over printed, but I am obliged to send what I have in default of better. You must recollect I do not submit them as specimens of workmanship, but merely as to the capabilities of the process in producing half tones.

A. Goodfellow.

REVERSED ACTION OF LIGHT.

Sir,—In reading the last few numbers of the "News," which had fallen into arrear, I was much interested by a letter of "W. H. B.," on page 287, inasmuch as he has met with a phenomenon which, within the last few days, has astonished and perplexed him. The only difference in the two cases is, that what occurred to him took place with the "dry," and to me with the "wet," process.

I had taken a few excellent stereograms in a beautiful little *den* in this neighbourhood, when I determined to try a large plate, having a delightful *bit* for a subject. When I had prepared the plate, I found that, from my position, the light had failed considerably; I therefore nearly doubled the time of the exposure, taking a figure seated among the rocks near the foreground of the picture. On developing the plate, it first appeared as a faint negative. I exhausted the first measure of solution, and then gave a good dose of silver, when, to my astonishment, I found myself in possession of an excellent *transparent positive*, instead of the negative which I had expected! I can, at the same time, detect in some of the high lights the slightest traces of the negative as first developed.

As you remark that "this phenomenon demands careful examination," I think it right to let you know my experience in the matter. Can the *time* of day have any influence in producing it? I should like to know whether "W. H. B." found it occurring in the early as well as the late part of the day. D.

Kinloch Rannoch.

WEAKENING NEGATIVES BY VARNISHING.

Sir,—It has frequently been remarked, and I believe is generally supposed, that negatives become somewhat more intense by varnishing them—and, indeed, it is true that they look so. But I can prove that the negative is weakened to some extent after it has been varnished. If only a part of the negative be coated with varnish, and a piece of sensitised paper laid on in the ordinary way, when the picture is printed it will be found that the dense part of the negative over which the varnish had been poured, and the adjoining unvarnished surface, have presented an entirely different result. Suppose the reduced silver to have been sufficiently dense to entirely obstruct the light where it was varnished the light will have entered and the paper will exhibit the characteristic purple hue, while the adjoining surface is white. The fact may be simply proved by sensitising a plate, expose to the light for an instant, then develop to the fullest extent. When dry, varnish half the plate and put it in a pressure frame with a piece of sensitised paper. I am of opinion that varnish upon a negative acts a similar part to that of oil upon paper—it renders it partially transparent.

A. Watt.

PHOTOGRAPHIC PROCESS ON COPPER PLATES.

Sir,—Allow me to draw the attention of my brother photographers to the following process, which has recently been communicated to the *Mechanic's Magazine* by Mr. Collin Smart, of Sunderland:—

"If some perchloride of iron be poured over a piece of polished copper (such as is used by engravers) the copper will immediately be affected, and its colour slightly changed. The plate may now be washed with water, and dried with a cloth, when it is sensitive to the light of sunshine. If a negative picture be placed upon it in the ordinary way, and it be then exposed to *sunshine*, in ten minutes or a quarter of an hour a beautiful black positive on a copper ground will be obtained. Silver may be used, but not so well.

"This experiment establishes the fact of the two substances, copper and perchloride of iron, acting photographically; the facility, too, of obtaining a picture to be engraved so easily and directly upon the copper-plate, will doubtless prove useful to engravers."

Some experiments which I have just tried seem to show that in the hands of some persevering amateur the above process is likely to lead to important practical results.

SPHYNX.

CONVERTING POSITIVES INTO NEGATIVES.

SIR,—In page 11 of the "NEWS" of September 9, I see two letters, one from Mr. C. H. Paine, and the other from "J. D." In reply to Mr. C. H. Paine, I beg to say that by the converting process named in No. 52 of the "NEWS," the apparently spoiled positive of Mr. C. H. Paine can be turned into a good negative, or, should he like it better, mix 5 grains of chloride of gold in 1 oz. of distilled water, which is to be poured evenly over the plate until it darkens as much as possible (this may be used over and over again until it is all used, and would do for about 10 plates, each 8 by 6) without washing off the adherent gold; now pour over the plate an ounce of water to which has been mixed 30 drops of hydrosulphate of ammonia, when it will assume a dark green brown colour, and is a capital negative. "J. D." can easily prevent his film from parting from the glass by drying it before each application of the intensifying mixture, only moistening sufficient to insure the equal flow of the fluid. F. D——M.

TO CORRESPONDENTS.

THE STEREOSCOPIC EXCHANGE CLUB.—It has come to our knowledge that persons whose names we declined to insert in the above list, on account of the inferiority of their specimen prints, are in the habit of sending similar prints to members, with the intention of obtaining good prints for their bad ones. Members will, therefore, do well, upon receipt of a stereogram, to assure themselves that the sender is one of their *confrères*; and if such should not be the case, we hope they will not, on any account, return an exchange copy. When the only condition of membership is the capability of taking a respectable photograph, such underhand proceedings are unpardonable.

J. S., Junr.—If you wish to follow photography chiefly as an adjunct to astronomy, you should try to master the collodion process first, and for this purpose you cannot do better than follow the instructions now being given in our pages by our talented contributor, Mr. A. Watt. For solar photography we think you will find the collodio-albumen process rather preferable to wet collodion, but a good knowledge of the latter is indispensable before attempting the collodio-albumen process. We would willingly follow your suggestion if we could feel assured such were the wish of our subscribers; we shall always be glad to answer queries to the best of our ability in any science whatever, provided they do not engross more space than it would be right to occupy in a journal principally devoted to photography. Our "Moon" is not published.

M. M. D.—1. Gutta percha cannot be melted so as to allow of its being poured into a mould. It decomposes when heated a little above the temperature of boiling water. 2. We have no acquaintance with the lenses you mention: they are, however, spoken well of in many quarters. 3. You cannot have a good varnish for negatives not requiring heat in its application. 4. It would be likely to answer very well lining the interior of a box with slabs of well-dried plaster of Paris, for preserving sensitive sheets in. We shall be glad to hear if experiment proves our anticipations to be correct. 5. A binocular camera, mounted on a sliding lath. A good landscape lens ought to embrace an angle of 50 to 60 degrees.

G. T.—By avoirdupois weight there are only 437½ grains in an ounce instead of 480, as in troy weight; consequently, if you have purchased one ounce of nitrate of silver by *avoirdupois* weight, you will find that there are only 7 drachms and 17½ grains in it. The complicated system of weights and measures now in use would be a disgrace to any civilised country, and has occasioned more failures in photography than all the other causes put together. This being the case, the only safe course to adopt is to give formulæ entirely in grains, or to employ the beautiful system of French weights and measures.

R. W. K., Junr.—Maxwell Lyte's gold toning bath, which we published at p. 301 of our first volume, ought not to decompose spontaneously, if prepared with pure materials. From your letter we fancy you have not followed the directions there given very accurately, as you ask us a question about recovering the gold, which he answers towards the end of the paper. If you cannot succeed a second time try the process given by "Θ" in the second number of our second volume.

S. B.—Your communication is received with thanks. Question No. 1 we are at present unable to answer. 2. We have heard nothing of our Algerine correspondent for many months. We begin to fear that something has happened to him, as we ought to have had frequent communications from him. 3. Smear the back of the print, and the surface of the card with india-rubber solution, and *allow them both to dry*; then apply them together and rub the surface, they will adhere perfectly without cockling.

BETA.—1. See the plate-cleaning liquid, given in our first volume. 2. Black velvet or green baize would answer best. 3. Employ a smaller stop. 4. About its own weight. 5. Until it will no longer dissolve the iodide of silver. 6. Experiment, with the pictures themselves, will be the only way to tell the proper shape and size; no general rule can be given. Mount with pure glue or gum arabic.

H. ST. C.—1. The streaked appearance is owing to the bath not being sufficiently acid. Add a few drops of glacial acetic acid, and the effect will cease. 2. Your silver wire dipper should be made of *pure* silver. Yours is alloyed with copper, which has produced the decomposition. Use either a *pure* silver dipper or a glass one.

P. S.—1. It does not much matter what kind of lens is used to place between the slide and the light. Have one as large as, or larger than, the picture, and of a tolerably short focus (4 or 5 inches), and place it near the picture. 2. A solar oil lamp gives, we think, the best light for the purpose. We have never tried gas.

W. D.—1. The acetic acid is either impure, or in insufficient quantity: this would account for the browning of your negative. The other faults are such as care and experience will soon overcome, as they seem to be chiefly connected with the manipulation. 2. Horizontally, with their faces downwards, is the best position for stowing away collodio-albumen plates.

X. Y. R.—After removal from the printing frame wash the sheet of paper over (in the dark room) with a diluted solution of nitrate of silver; the image will then develop of a crimson colour, and may be fixed by copious washing in water. Acetate of lead may be used instead of nitrate of silver, and a yellow picture will be produced.

C. S. W.—1. If a collodion negative is fixed by dissolving away the unchanged iodide, the time of exposure on the printing frame will be enormously increased. 2. The front lens of a portrait combination is sometimes used for landscape purposes; the concave or plain side should be turned *away* from the focussing screen.

W. L. S.—1. No one as yet has taken the process up commercially. 2. We will see if such articles can be given. 3. Apply to the inventor. 4. If we hear of such a thing we will bear you in mind. We will try and get further information on the paper referred to.

M. C. B.—1. For the 4½ and 7 inch lenses, we think the smallest stop should be ¼ of an inch in diameter, and for the 13 and 24 inch lenses ½ an inch will be a good size. 2. Expose rather longer, and develope with a weaker solution. A nearly colourless collodion should also be employed.

R. GORDON.—Some hyposulphite of soda has been smeared over part of the positive paper whilst there was free nitrate of silver on the surface. In other respects the picture is very good; there is, however, rather too much foreground.

F. L. G.—Any good collodion, especially one of rather a powdery character, would allow of 15 or 20 minutes elapsing between the removal from the bath, and the development.

MON AMI C.—We do not think the negatives of the two views are of much value. The stereograms of your own taking are very good o' es, and leave little to be desired, either in the negatives or positives.

A. HENDERSON.—Your letter and inclosure have arrived safely. We will with pleasure avail ourselves of the useful information contained in the letter, and shall be very pleased to receive the promised notes of your tours.

S. D. S.—Some mistake must have been made, as we have seen beautiful pictures taken by the linseed dry process in a very few minutes. Possibly some impurity was present in your chemicals.

G. D. S.—M. Natchet is an instrument maker in Paris. Your best plan will be to write to him.

J. SALTER.—An answer will be found in Mr. A. Watt's communications on this subject in recent numbers of the "PHOTOGRAPHIC NEWS."

V. C.—We will publish our correspondent's letter, as being the most ready means of obtaining information on this subject.

CHLORIDE.—1. Remove the roof from your room, and substitute glass in its stead. Second question not such as we can answer.

W. AGER.—We cannot give such information publicly. Send a stamped and addressed envelope, and we will answer you.

A. SIMPLE.—Your naphtha could not have been good. Obtain some tolerably pure benzol, and you will find the germ will dissolve in it by the aid of heat.

C. W.—Send us a list of those members of the Club who have not returned any answer to your communications, and we will inquire into the matter.

CLERICUS.—Add a few drops of nitric acid, and do not open the bottle more than necessary; keeping it *upside down* in a cool place as much as possible.

C. E. W. H.—The ordinary preparation will do, but we fear it will injure the silver bath a little.

E. SEELIG.—If you forward specimens, your name can be inserted in the next list.

J. ARCHER.—The aplanatic will suit your purpose, we think.

A CONSTANT SUBSCRIBER.—We will give the desired information shortly.

J. MOULE.—Received. We will consider the matter.

J. G. F.—We should like to hear further from this correspondent.

F. WALKER.—Your letter has, as you will observe, been attended to.

Communications declined with thanks.—P. P. S.—Stereo. C.—Omnibus.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—Mc Y.—F. L. O.—Timothy.—Eusebius, jun.—Δ.

IN TYPE:—J. H. H.—P. C. Stortz.—V. C.—M. M. D.—J. Walter.—H. M.—W. W. Hughes.—J. Archer.—A. Watt.—E. S.—Aliquis.—Nemo.—E. M.—G. H. W.—R. J. Fowler.—M. A. Root.—J. N.—B. M. Brackenridge.

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 58.—*October* 14, 1859.

THE FOTHERGILL PROCESS.

After so much has been written on the above process, one would surely have thought that enough had been said to insure its successful manipulation, even in the most unpractised hands. Pamphlets, articles, letters, and discussions have appeared in abundance, collodions have been manufactured expressly for this purpose, and advice given gratis. Yet, notwithstanding all, we find success is *not* certain, stains will appear, water marks will cover the film, sediments will rest on the plate, failures will arise, and poor dispirited photographers are compelled to cry out, in the bitterness of their despair, "Who will show us any good?" Are there no means, say they, of getting rid of the foul annoyances which damp the ardour of enthusiastic spirits, and bring a cloud over the sunny pastime of photography? We thought this process was to give universal success, and fail in nobody's hands. But disappointment again meets us. "Honey" and "sugar" were too sticky; "raspberry syrup," the cook truly informed us, would be more useful to her; "gin and water" wouldn't keep; "gelatine" and "Taupenot" made us sore with "blisters;" and now, alas! alas! "Fothergill" has failed us. Such, in effect, are the sad lamentations poured forth by several correspondents in the last eight or ten numbers of the "Photographic News."

Now, we hardly expected to hear such complaints, after the very minute instructions for the certain practice of this process, laid down by its expounders in the pamphlets, &c., alluded to. And we cannot but regard them as unfortunate, for so many complaints would seem to imply that there was something wrong in these implicit instructions. And, yet, who shall dispute them? When a process has been so deeply and carefully studied (and, of course, so extensively practised), that all its mysteries have been fully developed, and all its peculiarities of manipulation ascertained with mathematical accuracy, and given to the world, we should regard such a communication as infallible, and wonder how it was possible, if such instructions be closely adhered to, for any one afterwards to fail.

Now, in the Fothergill process, all this has been accomplished (so, at least, we are led to understand), and four drachms of water have been discovered as the exact and proper amount required to wash a stereoscopic plate! When these precious drops have been poured over it, behold a plate of wondrous sensibility, perfect in its freedom from stains, and one whose keeping properties remain unimpaired many weeks, even in the hottest weather. Again, dip the plate into a second, but diluted, nitrate bath, and, without further washing, apply the preservative, and you have a tablet on whose delicate surface stains and markings are unknown. Add to this that bit of practical wisdom, thrown out by a recent correspondent, which recommends deal boxes as best adapted for storing these sensitive plates when intended for long keeping, and you have a formula which is worthy of being given to the winds, to be wafted (of course for the benefit of photographers) to the farthest part of the habitable globe.

I am perfectly aware of the responsibility which he incurs who dares to call in question such high authority, or presumes to express a contrary opinion, and had I been the only one who has had just cause to do so, I should have hesitated before I ventured to raise my pen against it. But I have now no such scruples, and therefore do not hesitate to say that the slight washing so much recommended, and so positively laid down for this process, has been productive of more failures than any other cause; and that it is the fruitful source of most of the annoyances which your correspondents complain of, I have proved beyond doubt. Since this process was discovered I have worked it extensively, exclusively, and you will therefore conclude, successfully. Your readers have already been made acquainted with the result of one of my excursions last year, when I had not a single failure out of a large number of plates. When I prepared those plates, the process had only just been published by Mr. Fothergill, and, in the absence of fuller information, I adopted a system which a few experimental trials convinced me would answer, and the result proved I was not mistaken. That system was as follows:—On removing the plates from the nitrate bath I dipped them in another bath of rain water until greasiness disappeared; then, having tied a piece of muslin over a tap, I put them under, and with a tolerable stream washed back and front for four minutes (size of plate 10 + 8). After draining half a minute, I applied the albumen in no fanciful way, letting it run only in one direction, but running it well round the plate in every direction for about a minute, and then washed it off under the tap as before, four or five minutes. Draining and drying completed the operation. Nothing like a stain appeared on any of the plates, though they were kept five weeks in the hottest part of summer.

Shortly after this the process began to attract general attention, and the journals were filled with minute descriptions of its manipulation, prescribing what I have already stated as to the washing, with a host of other essentials. I immediately saw how extremely wrong I had been in washing my plates so much, but with fifty good negatives before me, I was very slow in being convinced of my folly, and, as people generally are, I was very reluctant to give it up. But as I was told I lost much sensitiveness by so doing, and saw that I should save time and trouble (things very dear to most photographers, especially the latter), by adopting the new plan, I determined this summer to do so. I did so partially (for I durst not wholly), merely washing the plates in the rain water bath, three in each change of water, and omitting the tap before applying the albumen. I developed three which had been prepared four days, and got three good negatives, though the plate which had been washed last exhibited a few dirty streaks. I now prepared four dozen plates in the same manner, and with a friend, likewise a Fothergillian, started the 18th of June on an excursion through Warwickshire and down the Wye. Three weeks from that date elapsed before I developed my plates—and a sad development it was. Instead of having a good negative on every plate, as formerly, I had only 15 or 16 good—the rest, on the application of the developer, all turned *red*, from evident decomposition, in addition to other stains and markings, similar to those described by your correspondents. A remarkable and important fact presented itself. I observed, when developing, that every third plate in the box was the one which invariably proved good, which led me naturally to infer that these were the plates which had been washed first after each change of water.

After my deep disappointment and rage had somewhat subsided, I came to the conclusion (though certainly not a consolatory one) that I was rightly served for having given up a method which a lengthened experience had proved to be certain, for one which my own judgment previously condemned, and which I now bitterly learned was nothing better than a plausible delusion.

I need scarcely tell you that I have since gone back to my old plan, and meet with the same successful results, never to see a stain of any description; and I am convinced that if your correspondent "G. R." (whose request and allusion to my former communication called forth this letter), and others who have been troubled with this annoyance, would adopt the system of *thorough washing* they would no longer have to complain of failures in that direction. I may here add that I only use the albumen once, washing out the measure each time, and keeping fingers free from albumen, silver, &c.

The "marblings," which I now never see, are due either to using the albumen too concentrated, or using it a second time, when water, silver, &c., from the first plate, have been unequally mixed with it. I use equal parts of water and albumenise with eight minims of ammonia to each ounce.

I will just say a word or two in answer to the objections which the "four drachm" advocates will thunder against me. I need say nothing in answer to a statement which I once saw in a contemporary, viz., that if all the free nitrate of silver was washed from the film the plate would be totally insensitive to the action of light—some nine or ten dozen negatives taken on such plates at once settles that matter; neither shall I say anything about the extra trouble required, as I would advise all those photographers who make this a consideration to give up the art at once, for I can safely assure them they will never get far into it; but what I have to say shall be confined to the chief objection mostly urged against this plan, viz., the fearful sacrifice of sensitiveness. Now this will be found a bugbear which disappears when it is approached.

I use either Keene's or Thomas's collodion, and with a Ross view lens (not orthoscopic), fifteen inch focus and half inch stop, my exposure is generally seven minutes in sunshine for landscapes, and five for buildings. Now, on plates which have been only *slightly* washed and exposed *two* or *three* days after preparation (a period of time for which such plates would probably answer), I have not been able to get a landscape perfect in detail in less than six minutes, so that I actually lose one minute by extra washing, which in a stereo. plate would amount to a few seconds! I leave it to the common sense of photographers whether such a "sacrifice" is worth half the bother which is made about it. I confess I never could understand why so much ingenuity should be wasted in trying to gain a few seconds—or shall I say minutes?—of exposure, when practising landscape photography. I can't see where the immense advantage would be if the exposure was one instead of one and a half minutes with a stereo., or five instead of seven minutes with a larger camera. So much, then, for that objection. I may further remark, that I have never met with insensitive patches, or irregular development in these tap-washed plates; on the contrary, uniformity of action seems to be one of their distinguishing merits.

If I am not trespassing too far on your space, I might confirm the principle of thorough washing now advocated, by a reference to the collodio-albumen process. We all know (at least those who have worked this process know), that unless the plates are *thoroughly* washed before coating with the albumen, they won't keep, and are worthless. Now I contend, that as the same preservative agent is employed in both cases, and at the same stage of the operations, the same combination between the sensitive fluid and albumen, whatever that may be, takes places in the one process as in the other, and that the subsequent washing off in the Fothergill does not alter that combination, or in any way affect the keeping properties of the plate. Viewed in this light, we may regard the two processes as precisely identical—the re-sensitising, &c., in Taupenot, being no additional, but totally independent, operation, and if much washing be required for one, why not for the other?

I shall conclude this article by remarking that the best way of proving the value of what is herein recommended will be to inclose you a few specimens, which I have much pleasure in doing, hoping you will find in them a better testimony to its merits than my pen has been able to record.

M. N. P. S.

[Respecting the above-mentioned beautiful specimens of the capabilities of the Fothergill process, our correspondent writes, "They were all toned according to the formulæ given by your correspondent 'Θ,' and which I like marvellously, *yellow whites* being an impossibility, and, what is more, I believe firmly they will *never* fade. I have had them suspended in a room since the first week it was published, which must be now nearly twelve months ago, and the whites are as unchanged, and the pictures every way as fresh, as the first day they were put there. 'Θ' deserves the everlasting thanks of photographers." They are, indeed, beautiful photographs, and deserve equal praise for the perfection of the negative process by which they were taken, the brilliancy of the printing, and the artistic selection of the view.—Ed.]

PHOTOGRAPHY IN NATURAL COLOURS.*

BY M. E. BECQUEREL.

These coloured impressions can only be preserved in the dark, but, in that case, may be so indefinitely. If, however, they are exposed to diffused or solar light, they change by degrees, and finally disappear. It is very remarkable, that it is only in a state, so to speak, of transition, that the sensitive matter possesses the property of reproducing the shades of the active luminous rays. Thus, in quitting the same physical state, the unchanged portion of the substance, in approaching the extreme limit of complete decomposition, exhibits different physical arrangements, according as it may have been struck by any particular ray. It therefore results from what I have been saying, that these coloured impressions are continually changing, even while we are looking at them, but if kept in the dark they cease changing; only, as the matter is not very sensitive, especially to the light of lamps, the impressions may be left for several days exposed to their influence without disappearing. The effect produced by diffused light is such, that if a coloured impression be placed under blue glass, for example, it would assume a blue tint, and finally a grey one; the same effect would take place with glasses of a different colour. The final state as to colouring would seem to be the same whatever may be the light to which the substance may be exposed. It would seem, then, that it is only in an intermediate state, as I have already said, that these colourings take place.

It is possible to obtain reproductions of coloured images in the camera—that is to say, to paint by means of light; but there are causes which prevent the paintings being comparatively as sharp, and having the colouring as vivid, as those of the luminous spectra. In the images of the camera the tints are more or less mingled with white light; it is, therefore, necessary that the action of white light should be prevented from changing the prevailing shades of the coloured rays.

In order to obtain this result, the prepared plates must be submitted to the action of heat, or to that of the red glasses, when the brighter colours will be clearly obtained, but the yellow and green tints will be less distinct; if the heating be not exaggerated the tints will appear, but the whites will be grey. On the other hand, the matter is but slightly sensitive, and several hours, and even several days, would be required to obtain these images; but, with care, these

* Concluded from vol. iii. p. 28.

failures may be, in a great measure, avoided. These last reproductions have, as yet, occupied but little of my attention, having, to me, only a purely scientific interest, as I do not anticipate that any occasion may arise for considering their application, as these impressions remain only in the dark, and fade, by degrees, when exposed to the light.

All efforts hitherto made to prevent this changing have been unsuccessful, and it is only in a *transition state* that the sensitive matter—a real mineral retina—possesses the remarkable property of retaining the impressions of the active luminous rays. I should add, that the experiments made by several persons using my processes, and which I have witnessed, are far from being as well-defined as those prepared by me, and which have been obtained by using all the precautions enumerated above.

When we have obtained a red colouring, if it is submitted, for example, to the action of a blue or violet light, it changes to blue or violet. If an image be coloured by the red glass, and the impression has not been of long standing, if the blue or violet portion of the spectrum be projected upon it, after a certain time the red tint disappears, and the blue tint predominates.

If a prepared plate be placed under a blue, green, or red glass, and a spectrum be then projected upon it, it exhibits, after a previous action, a coloured image of the spectrum.

If the image of the spectrum is carried so far as to have an intense red, and upon that there is applied a reversed spectrum, a violet portion would be applied to the red portion of the image.

I have used uniformly grey-coloured plates, and on projecting upon them a spectrum, have observed a mixture of tints, but by degrees the spectrum appeared in its own colours, and the original grey tint disappeared.

It requires from eight to ten minutes, according to the intensity of the light, to produce the prismatic proofs that I have submitted.

There is a very remarkable fact to be mentioned. If two plates covered with this matter be placed in a small vessel of water, so that one of them may receive the luminous rays; at the moment of the chemical reaction an electric current takes place indicating that chlorine is separated from the plate, and the effect takes place in the same manner and with the same intensity, whatever may be the colour of the active ray, provided that its luminous intensity be the same.

Can any method be found of preserving these images? Can the arts be enriched by images painted by means of light? This I cannot affirm. I have been content to make public my experiments in all their details, and to communicate a matter unique in its kind, which allows of painting with light, and to put the public in a position easily to reproduce the effects that I have obtained.

PHOTOGRAPHY CONSIDERED AS A RECREATIVE AGENCY FOR THE MIND OF THE EDUCATED.

It is pleasant to observe that even papers of a general bearing take up the cause of our art, and dilate on its general usefulness. Thus, the extract we gave some time since from an Irish contemporary, entitled, "The Pleasures of Photography," imparts to that art an educational, we may say social importance. As we intend to dilate on the assertions of our contemporary, we repeat a few lines of the article:—"How many a contracting chest and failing lung might experience, for the first time, the invigorating influence of that pure oxygenisation which is only to be found 'over the hills and far away?' Nay, may we not even ask, How many a purposeless life, by assuming this 'shadowed livery of the burnished sun,' might thus find an object; and in its health-bestowing, soul-expanding service, realise the fact, that 'life is earnest,' and progressing always, *Excelsior, excelsior*, go on to discover aims even higher and nobler than those which are to be found in the atelier of the sun?" How true, how feelingly said—A purposeless life!—the bane of many a well-disposed and well-organised mind!

But we have to adduce some additional evidence, that the occupation of photography may be instrumental to the contentment and health of the educated of all classes of society. Hufeland, a name of high authority amongst the medical faculty, has written a work on the *prolongation* of human life—lately, also, translated in this country. He speaks of the decay, or, at least, the decadency, which overtakes some people at a certain age—and he knows of no better *remedy* to rekindle the extinguishing power of mind and body, but the taking up of some *new* occupation, some new *life-scope*, as it were. Dr. Hufeland speaks of gardening, erecting new buildings, making collections of shells, coins, &c. He could not speak of photography, which as yet slumbered in M. Niepce's mind. However, our Irish contemporary is right. Photography is one of the most appropriate occupations for many a hitherto "purposeless life." It has every requisite for being the mind-recreator of any grade of society, at any age of life, and of both sexes. It implies no extraordinary expense, nor any great exertion of body, no long and tedious schooling and instruction, and can be practised everywhere—in "God's free nature," the palaces of art, the ruins of antiquity, the crowd of the market place; whence, also, by the way, Raffaelle took his ideal Madonna models.

"A purposeless life" is such a pregnant subject, if an easy remedy can be proposed, that we take it up under another point of view. The lines of Frederick Schiller, of which we quote the first, have been always reckoned amongst his fairest productions:—

"Occupation, which never relaxes——
Occupation, which never ceases."*

How this clashes with a purposeless life, is self-evident. With the younger amongst the wealthy, it will save many a slip, many a mistake in life.

But although occasionally we may become metaphysicians, we never relinquish the real basis of life. And thus, we say that it has been often observed that a fish we have caught, a hare we have shot, &c., are better relished than articles purchased with money. And here we may interpolate some *secrets* of periodical literature, unknown to most who merely read it. There is in New York a journal which yields to its owner a large income, and has made him the nominee for an ambassadorial situation. That paper pays for every contribution, by whomsoever sent, and from all parts of the world. The same is probably now the case with many of the illustrated papers. Besides those of London, there are one or two in Paris, one in Leipsic, one in St. Petersburg, and we think, besides New York, one in San Francisco. It is clear, that an interesting photograph from California has its value in London, and *vice versa*. And thus we resume by saying, every good photograph is a bank-note of some more or less value.

But here below, everything which does not progress, retrogrades. Thus, the more affluent and disengaged amongst amateur photographers should not confine themselves to the *passive* portion of the art, if we may say so. They ought to take up the pencil, the crayon, the brush, and complete their productions in that way, where photography is insufficient. For whatever purpose, however, photographs be made—for private amusement, or for public sale, the *choice* of the subject is of much importance. Still, one short rule will do on the present occasion, viz., "let every subject which the sensible photographer takes up, be worthy and fair." Such subjects have their worth and value everywhere, and at all times. But after having chosen a worthy subject, either of art, landscape, nature, portrait, &c., the province of the sensible artist consists in choosing the right *stand-point* for the taking of the photograph. Here not merely mechanical routine, but taste and tact come into play—faculties of the mind of a very high order. And thus it is evident that the intellectual and sensible practising of photography, implies also many things "not hitherto dreamed of in our philosophy."

* Beschäftigung, die nie ermattet——
Beschäftigung, die nie erlischt . .

Critical Notices.

Sur le Perfectionnement Pratique des Appareils Optiques pour L'Astronomie et pour la Photographie. Published by Mallet Bachelier, Quai des Augustins, 55, Paris.

M. I. Porro has published a little work under the above title to which we are anxious to call the attention of opticians who manufacture lenses for photographic purposes. So long ago as 1857, when the French Photographic Society was discussing the subject of improvements in lenses for photographic purposes, the author was requested to take part in the discussion; and the conclusions at which he arrived, after a due consideration of the subject, are embodied in three papers published in the *Journal of the French Society*. Since then it occurred to him that the principles and the methods of calculation he then laid down might be equally well applied to glasses used for astronomical and microscopical purposes, and generally to the construction of all dioptric and catoptric instruments, and for that reason he was induced to publish the book before us, which bears the date of 1858.

The theories contained in the papers published in the French journal are discussed at much greater length in this pamphlet, and a good many additions have been made.

As a prolonged consideration of the theories he promulgates would not be of interest to the generality of our readers, we shall only give the substance of a description of a new kind of lens constructed on the bases he has set forth. This most curious of the photographic object glasses hitherto made, consists of a panoramic object glass, composed of two flints and a crown, which allows of a rigorously exact panoramic view being obtained to an extent of 125° at one operation; consequently, the entire circle can be taken in three operations. In this lens the flint glasses are meniscus and tolerably thick. It is placed in the centre of the apparatus, in which two lateral cylinders are fixed for the purpose of supplying the instrument with the sensitive paper required in the photographic operations, which it can do to an extent which renders it unnecessary to open the instrument until the day's operations are brought to a close. Furnished with a compass, level, &c., this instrument is applicable to a rapid and complete survey of a country. "Everybody knows, in fact, how two perspectives, taken from the extremities of a known base, being given, one may construct the plan and the elevations of the ground; if to that is added stakes of known height placed at the principal points of the survey, and of which the size of the resulting images will be inversely proportionate to the distances, we shall have, even from a single station, the means of constructing the plan and elevation of the ground according to the panoramic perspective furnished by the instrument."

In order to guard against alterations which the photographic design might undergo in the developing and fixing baths, the cylindrical surface on which the paper is applied is divided into quadrangles of known size, engraved on glass; this quadrangle is produced identically on all the images.

Paper prepared by the dry collodion or albumen process appears eminently suited for this purpose, because it preserves its sensibility for a long time, and requires no manipulation on the field of operation. This instrument has been in use for some time in the Sardinian army, for the purpose of taking surveys, and we know of no reason why it should not be tried by the corps of photographers belonging to the engineers of the British army.*

Dictionary of Photography.

Filtration (*continued*).—Paper filters should be held in glass or porcelain funnels; the workroom ought to be furnished with several funnels of different sizes, varying in capacity from a quarter of an ounce to a quart. The sides should be straight, and the most useful form for the small funnels which are most frequently used in photographic and chemical experiments, is that of a cone, the sides of which are inclined to one another at an angle of 60°. The reason for this is, that after having folded a disc of filter paper into four, as recommended in our last number, it will, when opened, form a cone of the above shape, and will thus fit the funnel properly. In this way, also, the largest amount of precipitate can be collected on the smallest convenient quantity of filter paper; if the angle exceeds 60°, the funnel becomes too flat, the paper is too much pressed against the glass by the liquid. When, on the other hand, the angle is less than 60°, the filtration proceeds tolerably rapidly; but care is required in order to adjust the paper, to avoid unnecessary folds; and if the angle is less than 45°, the filter paper is obliged to be folded so much over itself that the passage of the liquid through is impeded, and the small quantity of solution that the paper will then hold, renders constant attention necessary, in order to pour in fresh liquid. In general, large funnels which are intended to hold a quart or more, may form an angle of from 45° to 50°, since they filter more rapidly, owing to the paper not being pressed so much against the glass. Some persons imagine that when the paper touches the glass on the greater part of its surface, it is an obstacle to filtration, and consequently funnels are sometimes made with the sides fluted longitudinally. We do not, however, think that filtration is much accelerated thereby. A better plan is either to fold the paper into the form of a *fluted* filter, as described at vol. ii., p. 235, or to place two or three glass rods between the paper and the sides of the funnel.

Some support for the funnel is necessary during the operation of filtration. The most simple plan is to introduce the stem into the neck of a bottle; but it is sometimes too large to go in; and it also frequently happens that a drop of liquid getting between the stem and the neck hermetically closes the bottle, and thus stops filtration; some other kind of support is therefore necessary. The most convenient support is a small chemical retort stand, consisting of a few brass rings, capable of being raised or lowered on a central rod, and fastened at any desired height by means of a screw and nut. Another very convenient plan is to have a piece of wooden board with holes in it, varying in size according to the funnels employed, and about half an inch less in diameter. If this is supported by means of uprights at each end, it will be found very useful for supporting funnels over glass beakers, dishes, &c. It may be either with or without a base board; but if without, some plan must be adopted for insuring steady support. A filter should always be moistened with pure water before the solution to be filtered is poured on; for if the turbid liquor were poured direct on to the dry paper, the latter would imbibe the water with such avidity, that some of the solid suspended matter would be sucked through, and would render the filtrate turbid. When the vessel which contains the solution to be filtered is too full to allow of its being poured out without danger of spilling, a glass rod will be found very useful to pour the liquid down, if the side of the vessel be made to touch the middle of the rod, and the stream be allowed to run down it into the filter.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS.—GLASS NEGATIVES.

By far the most important branch of the photographic art is that which comprises the taking of negatives, that is to say, pictures from which a number of positives can be produced upon paper by the processes of photographic printing. When we consider that an unlimited number of copies may be printed from a single negative without impairing its sharpness, and that the last copy will be as good as the first, some idea may be formed of the importance of the negative process. It is true, if bad varnish be employed to protect a negative, it may very soon become damaged; but as there is no friction in the process of printing from a negative, if the varnish be good, there can be no limit to the number of prints it is capable of producing.

* Our Paris correspondent gave a detailed account of this panoramic camera, in vol. ii. p. 212

Good negatives, like valuable engraved plates, have now assumed an air of importance and value in the commercial world which few could have anticipated ten years ago. It is not long since, I believe, that a thousand pounds were given for the copyright in the negatives of a picture which is now to be seen at almost every printseller's shop in London. And I dare say there are many other negatives extant, for which the owner would not take even that sum.

No wonder, therefore, that photographers now devote almost their entire attention to the production of negatives; and as I am now about to instruct the student in this branch of the collodion process, I hope soon to put him in a fair way to enter the lists with the members of photographic science.

The difference between a negative and a positive, when viewed with the film uppermost, and by transmitted light, is only in the density—the latter, as I have before observed, being too weak to resist the light in the process of printing. Therefore, to obtain a negative, we must form such a dense deposit of silver upon the film, that the light will be properly obstructed in those parts which are required to be white in the positive print. To impart to a negative the exact amount of intensity in the process of developing is a feat which none but an experienced photographer can perform with certainty; and even the most accomplished in the art are at times unable to rely with absolute certainty upon producing a negative which is neither over nor under developed, but the exact mean between the two. Of course the eye is the only guide under such circumstances; and he who has the most experienced eye will naturally be the least liable to err in this respect.

Generally speaking, a good negative possesses the following characteristics, but this may depend much upon the nature of the subject from which it has been taken:—If it be the portrait of a sitter, or a copy of a picture which exhibits a strong contrast of light and shade—for instance, a line engraving, in which some parts are absolutely white, whilst others are a deep black—the dark parts should be perfectly clear as the glass itself, and all the light parts of the picture or of the sitter will appear of the various gradations of density which are necessary to give a harmonious tone to the whole. In the case of a portrait of a man, for example, the shirt-front, being the whitest item of detail, will be the most dense, and, on looking *through* the negative, this will appear black, as also will the face and hands, though there will appear slight shadows in these, necessary to give them form. If the negative be an accurate one, even the slightest pimple or wrinkle on the face will appear upon the plate. The light which reflects from certain parts of the coat also will be faithfully transmitted to the negative; whilst those parts of the coat which are in shadow—such as the folds, and those parts which are beneath the arms—will be quite clear and black in the glass negative.

In a negative taken from a line engraving or mezzotint, every particle of detail should appear, even to the minutest degree, which will be the case if the plate has been exposed sufficiently in the camera. The absence of any of the details of the picture upon the negative prove either that the exposure has not been continued long enough, or the collodion, being too old, has lost its power of giving the "half-tones," as they are called. In such a case as this, pushing the development will not aid in bringing out the details, as they have not been impressed by light. The collodion in such a state must either be abandoned or mixed with some new collodion, which will often give a very good result. This mixture, however, would be too inactive for portrait taking, where the operation must be conducted with all possible speed.

Before proceeding to take a negative picture, the student will have to provide himself with the following materials:—

One drachm iodide of potassium.
One drachm pyrogallic acid.
One ounce glacial acetic acid.
One ounce alcohol.
Two ounces negative collodion.
One ounce nitrate of silver (*crystallised*).
One ounce negative varnish (*French*).
One ounce cyanide of potassium.
One pound hyposulphite of soda.
Half pennyweight fine gold.
A few sheets of extra albumenised paper.
Several clean bottles capable of holding from four to twelve ounces each.
A small porcelain evaporating dish.
Half a gallon of distilled water.

When the above articles are procured, the pyrogallic acid, nitrate of silver, and hyposulphite of soda should each be put into bottles, those which have wide mouths being the most convenient. Each bottle must be labelled.

A twelve-ounce bottle may next be well rinsed and put aside ready to receive the sensitising bath, the preparation of which I will next proceed to describe.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

If the curve in a glass tube be required to be gradual, the heat should not be confined to one spot; the tube should be moved constantly backwards and forwards for an inch or two on each side of the chalk which marks the centre of the curve. When indications of the glass softening are perceived, the moving backwards and forwards is to be stopped, and the tube simply turned on its axis, keeping it in one spot for a few moments; it will then yield to gentle pressure, and a very slight bend must be given; the tube is then to be moved so as to bring the point immediately adjoining this bend above the flame, which must, after softening, be bent in like manner, and so continue until a curve of the required span is obtained, and the two limbs form the required angle. As the operation cannot very conveniently be interrupted to permit a careful examination of the angle in course of being produced, it has been recommended that some object possessing the required angle be placed on the further side of the flame, so that on bringing the tube under operation and the said object both into the line of sight, the eye may be guided in producing an angle of true proportions.

If the tube become partially collapsed or flattened whilst in the flame, which, in bending a very thin tube, sometimes happens, it may, with care and skill, be remedied. The best method is to stop one end, either by corking tightly or by sealing, and then, whilst the glass is still soft, to blow into it, which will generally restore its proper cylindrical form. A method sometimes adopted to avoid the danger of thin tubes collapsing in bending, is to fill them with sand, and heat them over a charcoal fire at as low a temperature as possible.

Drawing out glass tubes so as to terminate in a fine aperture, for pipettes and other purposes, will be conducted on the same principles. In some cases it is desirable to thicken the glass, and contract the aperture at the point to be drawn out first. This is done by rotating an inch or two of the tube in the flame, and when it softens, pressing the ends towards each other gently, taking care to avoid bending the tube, or forming wrinkles. The portion of the tube so operated on will have contracted in diameter altogether, but the glass will be thicker and possess more substance for subsequent operations. In drawing the tube out, whether thickened or not, the portion to be drawn out will be softened in the flame, keeping it turning properly: if an extension of uniform contracted diameter be required, two or three inches of the tube will require heating, and it should be drawn out at the lowest temperature it will admit of, slowly and steadily, as, if it be suffered to become too soft, it is difficult to prevent it suddenly coming to a point and dividing. If, on the other hand, a capillary aperture be required, a less portion of the tube should be heated, the softening may be carried further, and the extension effected more suddenly.

In conducting many of the operations with glass tubes, especially those of large calibre, a glass-blower's table and blowpipe are requisite. Many useful operations may, however, be effected without them, and where the heat produced by a blowpipe is required (of the modes of using which we shall speak hereafter), the common mouth blowpipe may be used. One made of glass tube may easily be produced by the method we have just been describing. A piece of tube of about one-fourth of an inch diameter should be drawn out, gradually tapering, through a space of about three inches, to a fine point. About two inches from the small end, the tube should be bent almost at right angles. The total length should be about eight inches; the exact length being regulated by the focus of the operator's

eye: if he be short sighted the blowpipe must be short; if long sighted, the blowpipe must be proportioned to the length of the sight. The form is like the following:

A blowpipe of this kind, whilst somewhat brittle, and apt to be fused at the point, will generally answer most of the purposes of the amateur, as well as a more complicated and costly article, and has the advantage of being easily renewed when destroyed.

(*To be continued.*)

Photographic Chemistry.

THE METALLOIDS.—*Oxygen. Equivalent* = 8.

THE discovery of oxygen is usually ascribed to Priestley, he having announced it in 1774, though it was obtained very shortly after by Scheele and Lavoisier, who, ignorant of his discovery, as it is said, succeeded in obtaining it by a different process. Oxygen is a colourless gas, possessing neither smell nor taste. It abounds in nature, there being few substances in which it is not present, but it is never found pure and isolated. Mixed with nitrogen, in the proportion of 1 part oxygen to 4 of nitrogen, it forms atmospheric air. It is a permanently elastic fluid, that is to say, one which there are no means of compressing into a liquid or a solid. Though it is a difficult process to separate this gas from the atmosphere, there exists no great difficulty in compelling compounds which contain it to part with it. To demonstrate this, take a Florence oil flask and twist some string around the neck, for about two inches downwards, and put therein a small quantity of red oxide of mercury, close the mouth with a cork, through which is passed a glass tube, bent at the two extremities in opposite directions.* Immerse the end of the tube in a vessel of water, and invert over it a bottle filled with the same liquid. Place a lighted spirit lamp, or a small gas jet, under the tube, and in a very short time bubbles will be seen to rise through the water. The bubbles which first rise are common air, and should be suffered to escape, those which follow will be oxygen; and in proportion as this gas enters the bottle, water will be displaced. When this is entirely accomplished, and the bottle appears empty, pass a cork under the water and cork it up; it may then be removed without danger of the gas escaping. The moment when the heat has driven off the last portion of the oxygen, will be seen by the mercury having re-assumed its elementary form. This is a very convenient and easy method of obtaining oxygen in small quantities; but when this gas is required in large quantities a different plan is adopted, rendered necessary from the comparatively high price of oxide of mercury. Instead of this substance, peroxide of manganese is substituted; but a glass vessel will not be able to resist the intense heat necessary to compel this oxide, in a dry state, to part with a portion of its oxygen, hence a cast-iron bottle is used, into which it is placed in a powdered condition, and heated gradually in a coal fire, or on a charcoal furnace, until it is a bright red. The end of the tube connected with this bottle is immersed in a vessel of water in the manner described above, only the bottle or glass cylinder in which the gas is received is larger, and it is advisable to employ a pneumatic trough. It is very seldom that the manganese is free from impurities, the most common being carbonate of lime, which, being calcined in the operation, gives off carbonic acid gas, which mingles with the oxygen. To remove this it is customary to put some slaked lime in the water, or dissolve therein some caustic potash.

The experiment may be made with peroxide of manganese in the following manner:—Put a small quantity of this substance, powdered, in the flask and pour on it sufficient concentrated sulphuric acid to bring the mass to a pasty consistency; put in the cork, and arrange the tube in the same manner as in the first experiment. Apply heat to the flask and oxygen will soon be evolved. The first bubbles in this and in all similar experiments must be allowed to escape, as they consist of atmospheric air. By the use of sulphuric acid in this operation the peroxide of manganese is deprived of a larger amount of the oxygen it contains than by the application of heat alone. The protoxide of manganese, or, as it is commonly called, black oxide of manganese, has a great affinity for sulphuric acid, so that, no sooner has a certain quantity of oxygen been given off, than the acid combines with the protoxide, and forms the sulphate of protoxide of manganese.

(*To be continued.*)

* As it may frequently be found necessary to bend glass tubes, we may as well take this opportunity of showing how easily this may be accomplished. Place the part of the tube where the curvature is required in a jet of gas, or the flame of a spirit lamp, keeping the tube rotating with the fingers. As soon as the glass has softened sufficiently, bend it very gradually until it forms the requisite angle.

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 11th October, 1859.

A RUSSIAN photographer, Count de Nostitz, who has produced some exceedingly pleasing photographs, taken at or near Tiflis, has given, in a letter to M. Ch. Chevallier, the following description of the process on collodion, which he has employed with invariable success. The composition of the collodion is thus:—

Fulmi-cotton	(by weight) 3	parts.
Sulphuric ether	500	„
Alcohol	200	„
Iodide of cadmium	4	„
Bromide of cadmium	2	„

This collodion, it appears, can be preserved for a very long time. M. de Nostitz uses at present a collodion that was prepared a year ago, and obtains very good results; he generally sensitises it the evening before he begins to work. The sensitising bath contains:—

Fused nitrate of silver	9 to 10	parts.
Distilled water	100	„

To this bath the author adds a minute quantity of a mixture of ether and alcohol, holding in dissolution some iodide and bromide of cadmium.

The developing liquid is composed of—

Distilled water	2000	parts.
Pyrogallic acid	5	„
Crystallisable acetic acid	120 to 150	„

The author generally employs this for landscapes; for portraits he prefers sulphate of iron. To strengthen the proof, a liquid containing 100 parts of distilled water, with 5 parts of fused nitrate, may be used with advantage. Finally, the image is fixed in a bath containing cyanide of potassium 4 parts, to distilled water 100 parts.

M. de Nostitz asserts that he has often operated with the above mixtures at a temperature of 48½° Reaumur, without any loss of sensibility. "This observation is not devoid of interest," says M. Chevallier, "as it proves that collodion may be employed in hot countries, in spite of the volatility of its constituents." . . . To which we may add, that when once the collodion is on the plate, we should like to be informed what volatile elements it contains which could be volatilised by the heat of the hottest climate?

M. de Nostitz, for the positive paper, uses the following:

CHLORIDE BATH.

Chlorihydrate of ammonia	4	parts.
Distilled water	100	„

SILVER BATH.

Distilled water	100	„
Fused nitrate of silver	18	„

HYPOSULPHITE BATH.

Filtered water	600	„
Hyposulphite of soda	100	„
Acetate of lead	4	„
Chloride of gold	¼	„

The proofs remain in the latter bath for four or five hours, and acquire very fine tones; they are afterwards washed,

care being taken to change the water several times in the four-and-twenty hours.

Some French papers have spoken lately of a new process for obtaining a kind of carbon destined to act as a substitute to animal charcoal, lamp-black, &c.

Animal charcoal, the finer qualities of which are termed ivory-black, has hitherto been obtained by the calcination of bones in closed vessels. As it has numerous uses, and as its supply is somewhat limited, its price remains rather high. Lamp-black cannot be employed to discolour syrups, &c., and there are many cases in which the former variety of charcoal is preferred. M. Goffin, it appears, has succeeded in obtaining a product that can enter into competition with animal charcoal in every case where the latter is employed. He takes a certain quantity of *Boghead Cannel Coal*, calcines it in closed vessels, or in gas furnaces, and the product of the calcination is reduced to powder in a mill, sifted, &c. until it has acquired the proper degree of fineness. The variety of carbon thus produced is remarkable for its density and its homogeneity—two circumstances that would, perhaps, render it useful in the production of carbon proofs.

The author of this process declares that carbon, prepared in the manner described, may be used with advantage as a substitute for animal charcoal, ivory-black, lamp-black, &c.; "for the bleaching of sugar syrups, for disinfection or deodorising, for colours, for printing, &c."

Two new photographic works have been published here within the last few days. The one is a second edition of M. Van Monckhoven's work; the second is by M. de la Blanchère: it constitutes a large octavo volume, entitled *L'Art du Photographe.* In the latter work the author treats of the various processes with which he has obtained the best results. He has not had the intention of writing an elementary treatise for beginners; but, as he states in his preface, he has preferred to develop the artistic and intellectual parts of his treatise, rather than those which concern manual operations. M. de la Blanchère is known to the Parisian photographers by some able articles he formerly published in the journal *La Lumière.*

There is an *on dit* in vogue here for the moment, of a large dark body, of a singular appearance and about the dimensions of our globe, having been observed by astronomers a week or two ago, upon the disc of the sun, where it appeared as an immense spot, suddenly sending out bright flames and *burning* (!) vividly for two or three hours, when it was extinguished and disappeared completely! I hope it was photographed. Now, this large spot, which is so much talked about, must have been the one observed by the R. P. Secchi, director of the Observatory of Rome, during the period of the famous aurora borealis of the 29th of August last. Your readers will, perhaps, remember that in one of my former letters, when speaking of some recent magnetic researches by Professor Hansteen, of Christiana, and others, I particularly mentioned the unmistakable coincidence that exists between the sun's spots and the variations of the magnetic needle. The R. P. Secchi, in a letter addressed to the Imperial Observatory of Paris, expresses himself as follows concerning the perturbations of the needle during the period of the aurora borealis of the 29th of August:—"It is extremely remarkable that these great perturbations should have coincided with a maximum of solar spots, and should have happened precisely at a moment when *an immense spot was visible on the disc of the sun, even without the aid of the telescope* . . . This spot was very remarkable by its peculiar aspect and the filaments and currents of which it was formed, showing a state of great agitation." The R. P. Secchi has made a drawing of it, which will doubtless appear in time in the *Annali* of the Roman Observatory. I am not aware whether this peculiar phenomenon was witnessed by any other astronomers of renown; up to the present time, I have no other reliable news of it.

It would, perhaps, be interesting, as the occasion presents itself, to say a word or two of the sun's spots. Their discovery was a most important element in astronomy, for they furnished us with a means of observing the rotation of the sun, up to that time unknown. These spots appear to have been observed for the first time in the year 1611; and though this observation is attributed by some to Galileo, it appears certain that Fabricius was really the first to observe them. The earliest work in which they are mentioned is entitled *Joh. Fabricii Phrysii, de Maculis in Sole Observatis, &c. Wirtembergæ*, 1611. Scheiner's work on solar spots—*Epistola ad Velserum de Maculis Solaribus*—was published a year later, in 1612; and Galileo's *Storia e dimostrazioni intorno alle Macchie Solari e loro accidenti*, appeared at Rome in 1613.

M. Secchi, whom we have quoted above, speaks of a spot observed with the naked eye, or, at least, without the aid of a telescope. We have other examples of like phenomena, which have been consigned to history. In the *Annales de la Chine*, by M. Mailla, we read that in the year 321 there were spots upon the sun which were observed by the naked eye. According to Joseph Acosta, when the Spaniards arrived in Peru, they learned that the natives had observed spots upon the sun. Many suppositions have been advanced to explain the phenomena of solar spots—some of which are very remarkable; Laplace, for instance, speaks of spots four or five times as large as the earth. In the time of Fabricius they were thought to be planets, and each spot received an appropriate name! But as they were never observed outside the sun, this idea could not exist. Some have advanced that they were scoriæ floating on an *ocean of fire!* But this theory does not coincide completely with the data observation furnishes.

In November, 1769, Alexander Wilson, an English astronomer, supposed that the sun's spots were *excavations in the luminous matter of the sun*, and from this supposition sprang the theory of the constitution of the solar orb, which is now-a-days generally admitted. The sun is composed of three distinct bodies,—an opaque dark nucleus, a dense and cloudy atmosphere, and an exterior luminous atmosphere, sometimes called *photosphere*. The solar spots result from openings in these two atmospheres. The dark central part of the spot is the body of the sun itself; the penumbra, which is seen to surround the dark central spot, is the dense cloudy atmosphere seen through an opening in the photosphere or luminous atmosphere. Arago, by the aid of his polariscope, has shown us that the nature of the light which emanates from the photosphere or luminous atmosphere of the sun, is identical with that which emanates from a flame produced in the combustion of gas; and that this light is quite distinct from that which is emitted by a solid body, heated to a red or white heat, and from the light which is emitted by a liquid, such as melted iron or glass, &c. Hence he concludes that the photosphere of the sun is a *gaseous body*.

M. Kessler has made known a means by which the residues of galvanic piles and batteries may be utilised. In Bunsen's battery, which is so frequently employed, a large quantity of sulphate of zinc, more or less pure, is produced, and, in commerce, there is very small demand for this salt. M. Kessler recommends its transformation into sulphate of soda:—When equal equivalents of sulphate of zinc and chloride of sodium are mixed together, and the solution allowed to crystallise at or above 10° (centigrade), the crystals that form are composed of a double sulphate of zinc and soda; but if the liquid be made to crystallise at *zero*, the crystals deposited are pure sulphate of soda; and the liquid decanted from them may be used with advantage to prepare oxide of zinc.

The same author adds that he has found at the same time a similar method of treating blende (native sulphuret of zinc). Blende is transformed into sulphate of zinc, and mixed with chloride of sodium; the solution is made to crystallise at *zero*, when pure sulphate of soda is deposited in crystals, and the chloride of zinc decanted off serves to prepare oxide of zinc or *zinc white* (carbonate of zinc).

M. Vögel, the well-known German chemist, has made a curious, and may be very useful experiment, with the carburetted hydrogen gas which is used to light the streets. He caused a current of this gas to pass slowly through a certain quantity of oil of sweet almonds, contained in a Liebig's tube. The oil, after being submitted to this treatment, was found to have augmented in weight 9 per cent., and to have condensed some carburetted principle, the nature of which has not been determined, which caused the oil to burn with a much brighter flame. M. Vögel immediately applied his discovery to lamp-oil, and found that it augmented in weight 20·5 per cent. What is quite as surprising, the gas which had passed through the oil burnt quite as brightly as before the operation.

Wax, fat, and stearine act upon the carburetted hydrogen in the same manner, and lose part of their consistency. M. Vögel thinks these facts may, perhaps, lead to the discovery of a means of improving lamp-oil, and giving it the property of burning with a brighter flame.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

The climate is not, on the whole, more unfavourable to photographic operations than that of Europe. In the hot weather I found the interior of the tent which I had brought out with me so stifling, that I was obliged to have it coated with a bright white composition, which had the effect of making it a little more bearable, and I likewise had the camera covered in a similar manner; but the necessity for working during the hottest part of the day did not often arise, except occasionally, when we were travelling. I do not think the time of exposure differed materially, but I cannot speak positively on this point, because the collodion which I had taken with me from Europe had become so deteriorated by the voyage, that I was obliged to make what I used from materials I bought on the spot; and as I never found it worth while to make my own collodion at home, I was subjected to many failures in preparing it. However, with the help of *Il Plico del Fotografo*, I at last succeeded in obtaining a sufficiently good collodion to work with, though its sensitiveness was probably inferior to the preparations used by you.

My first operations, after forming my engagement with Dsetjuma, were naturally confined to his house and garden; after which, he himself sat for his portrait. He was delighted with the result, and ran into the house to exhibit the representation to the ladies of his family, and nothing would satisfy him but that I should take all their portraits in succession. Of course I had no objection; on the contrary, I felt rather curious to see what they were like. So I had a couch brought from the house to the immediate vicinity of the grotto—now become my dark room—and arranged cushions upon it to give them a proper degree of elevation. Presently out came Dsetjuma with a lady, behind whom a female walked carrying a huge umbrella. At first she seemed rather shy of me, and kept her fan before her face; but as this was an obstacle to my taking her portrait, it was necessary that she should remove it; but it was a long time before she would give it up. I then posed her, with the attendant standing behind her holding the umbrella. I requested her husband to explain the necessity of her remaining perfectly still, and that I should not look at her while the operation was going on. Accordingly, I turned my back, removed the cap from the lens, exposed, and then restored the cap, and removed the plate from the camera. On developing, to my great surprise, I found the figure come out very well, but the head and face assumed the form of an irregular patch, in which no trace of features was visible. A closer examination showed that she must have thrown something over her face at the moment I removed the cap; and, on her husband questioning her, she confessed that she had done so. We showed her the picture as it was taken; but the only effect this had was to fill her with the most absurd alarm. At first, I believe she thought I had deprived her of her head by magical means, for she raised her hand to it immediately. A good many believe in magic here; and even when she had satisfied herself that it was in its proper place, she positively refused to sit again at that time. Of course her reluctance was eventually overcome, and after that the other ladies were willing enough to follow her example; indeed, their willingness became rather a source of annoyance, for they were not content with getting Dsetjuma to bring them to me to be photographed in all sorts of attitudes, but, when they became accustomed to me, they would come into my dark room and pull the bottles and apparatus about, and dip their fingers into the silver bath, and tattoo themselves on their arms and bosoms, until they found it made them smart a little, when they left off the latter amusement. In addition to this, they had a large circle of acquaintances, and all these were brought to me to undergo the operation of having their portrait taken, until I began to think I should have done much better if I had had a gallery built for the express purpose, and charged a fee for each portrait. Subsequent experience taught me that, in such a case, I should not have received a visit from any of these ladies; but I was not aware of this at the time, and felt a little vexed occasionally at having so much trouble. It must be remembered that I had to manufacture nearly every substance I used—not only collodion, but nitrate of silver, hyposulphite of soda, and, in short, everything I did not make myself had to be tested, and the impurities, if possible, eliminated; consequently, when my stock of chemicals ran low, it was no light matter to replace them.

In this way several weeks ran on pleasantly enough. My post, so far as the peculiar duties of a secretary were concerned, was a sinecure, and it might have been more correctly defined as photographer in ordinary to his Excellency Dsetjuma. But this was not what I wanted; my object was to see something of the interior of the country, and to penetrate to places where Europeans had never been allowed to wander. My appearance was not calculated to excite any special attention, and, I believe, I was now generally presumed to be a native. Naturally very dark, I had added to this by deepening the colour of my face and hands, by washing them with a weak solution of nitrate of silver, and suffering them to dry in the sun, until my complexion was only a little fairer than that of a native, and not nearly so fair as that of some of the women; my hair was dressed in the Japanese style; and, altogether, I was not a bad specimen of a native; according to my Dutch friends, my only fault was that I was a little too grave.

Before I go further, I may as well correct some very erroneous notions, on the subject of the manners of Japanese women, which, I find, from some German newspapers received here, are current in England. If these newspapers are correctly informed, it appears that some of the gentlemen connected with the embassy, which arrived here some months back, have spoken of having met ladies in public gardens, and of their great amiability, and so on. Now, Japanese *ladies never* go to these places; the females who do frequent them are just as much entitled to the appellation as are those of the same sex who frequent similar gardens in the suburbs of London, if I may believe what was told me respecting these latter by a most respectable Englishman, during my visit to your city. As to their amiability, I do not believe it to be assumed; it is a national characteristic, which, in them, is not kept down by any feeling of irritation arising from a sense of their degraded position; for the simple reason, that, judged by the Japanese standard of morality, their occupation is not one to inspire either pity or contempt. Nay, more, among this class are to be found some of the best educated and accomplished women in Japan, upon whose education considerable sums of money have been expended by the men or women who purchased them, when children, from their parents. The women who were seen to take their bath in the open air must have

* Continued from vol. iii., p. 58.

belonged to this class, and though the gentlemen who saw these things may imagine that all the women were alike whom they saw, I must beg to assure them that they did not see respectable women at all; these remain in-doors generally in the morning, and, when they go out to pay visits, rarely or never walk. These gentlemen may, perhaps, think that, if they were mistaken, the immorality which exists in Japan is very great, and, unfortunately, this is so; but it must be borne in mind that Christianity is now unknown here, and that it is hardly fair to judge them by a European standard. Let us hope that one of the results of bringing this country into communication with your own and other countries, will be the spread of the Christian religion, though the great obstacle to this will be the want of teachers who thoroughly understand the language, which is very copious and very difficult, and, moreover, the government will oppose it strongly. The only hope which I can see of permission being granted to teach the Christian religion, lies in convincing the emperor himself of its truth. I have dwelt at some length on these statements, because I feel a warm interest in those who really are the women of Japan, in which term I do not include the frequenters of tea-gardens and hotels; and, besides, I am sure that your readers will be glad to know the truth on this point from one who has lived among them.

When I hinted to my employer that I should like to make a trip into the interior, he raised so many difficulties that I was almost ready to despair. I did not doubt that he himself was willing enough to go, but he was afraid of the consequences—of its becoming known that he had taken a foreigner into the interior, and that that foreigner had taken pictures of the country. He assured me that if such a thing became known (and it would be utterly impossible to keep it a secret), death would most certainly be his fate, and, what to me was at least of as great importance, mine also. In this dilemma a bright idea occurred to me: I proposed that he should practise photography under my instructions until he was sufficiently proficient to take a portrait without assistance, so that he might be able to operate in my absence, in the event of that being necessary. When he had advanced so far, I suggested that we might travel in reversed positions, he as master and I as assistant. This suggestion appeared exactly to meet his views, and the next day was spent in initiating him into the mysteries of pouring collodion on a plate, sensitising, and the other manipulations incident to the practice of our art, with such amount of theoretical explanation as should enable him to give a reason for what he did. A very few days sufficed to make of him a very fair practical photographer—I mean one who could take a picture when he had all the solutions ready prepared for him, which was all that was necessary under the circumstances; and I thought that now we should start without much further delay, but I was again disappointed. I had not taken into consideration the pride he would feel in acquiring a knowledge of an art which appeared to him little less than magical, and which to his friends was magic of the very highest order. Hence, day after day went by, and there was always a new friend to be astonished to-morrow. At last, time did its usual office, and though the number of his visitors, whom the fame of his wonder-working machine brought to his house, continued to increase, he began to get tired of astonishing them, and we set about seriously discussing the details of our journey.

The first question to be decided was how we should travel. The cheapest way would be on horseback, with a couple of baggage-horses to carry our luggage; but there would, in that case, be the continual risk of some of the fastenings giving way, and the whole object of our journey would be destroyed, by the bottles being broken. We therefore decided on going on horseback ourselves, and having the camera and other things packed in the palanquin used by the ladies. This conveyance was extremely light and convenient; in length it was between six and seven feet, and in height rather under five feet, and the same in width. The sides were formed of pieces of bamboo, both sides flying back round a pillar on a knob being pushed, in the same manner as I have described in the case of the panels of the summer-house. These sides were ornamented with figures of fabulous animals, houses, and landscapes, done in gold and ivory, with very little regard to the laws of perspective; the whole was covered with a beautiful varnish. This ornamentation was the work of the ladies, who amused their leisure hours in this way, instead of spending their time in making fanciful imitations of Moses among the bulrushes, the judgment of King Solomon, or a little dog with a pipe in his mouth, all in Berlin wool, as is the fashion among you.

This conveyance was supported on a light but tough piece of wood, which projected some five or six feet beyond the litter at either end, in the form of two poles, intended to rest on the shoulders of the bearer or bearers, for the width between them was such as to allow of one man walking with a pole resting on each shoulder, or for two bearers to carry one pole each.

This machine was exactly the thing for the purpose, the only drawback to its use being that it required four men to carry it, in relays of two each. However, it offered so many advantages over a packhorse, that we decided on using it to carry our luggage, we ourselves going on horseback.

On the morning fixed for our departure, I had the honour of breakfasting with the ladies for the first time. I looked upon it as a sort of sacrifice to propitiate me in favour of their worthy lord and master; for they still seemed to have a vague suspicion that I practised an unholy art, which I thought had entirely disappeared, but which seemed to revive at the moment when they were going to entrust their beloved alone with me for an indefinite period. The parting was very affectionate on both sides, and I fancied Dsetjuma was disposed to give up the trip; so I addressed questions to him to divert his thoughts, and after he had had a long private interview with one of them, who seemed to have a rather undue share of his regard, he joined me in the garden, where I had been giving a last look at the contents of the litter, to make sure that nothing had been omitted. Here we mounted our horses, before emerging into the street, and I must acknowledge that I felt a little ashamed at seeing a man walking beside my horse's head, and holding the bridle, but as Dsetjuma entertained no such feeling, and as it is a common practice among Japanese citizens, I felt bound, as a real child of the country, to make no objection. In this way we proceeded along the streets of Nangasaki, Dsetjuma and I riding side by side, each with an esquire holding his bridle, and the litter borne behind us by the remaining two attendants. I have already observed that my appearance approached so closely that of the Japanese as regarded colour of the skin, that a casual spectator would never have imagined me to be any other than a native, so that we excited no sensation among the people through whom we passed. Now and then we saw one of Dsetjuma's friends, who may have imagined I was not a native of one of the islands adjacent to their coast, as he told them I was, but they made no observation to me on that point, confining themselves to making a polite remark to me, to which I replied with a bow, smoking in the meantime like a small furnace, and looking as grave as a Dutch burgher, who finds, on balancing his accounts, that he owes rather more than he has got to receive. I would recommend anybody who intends visiting a foreign country alone, to practise smoking; it gives him opportunities of observation which he would not enjoy otherwise. A man smoking may sit for hours in a public place, and watch the manners and behaviour of those present, without exciting any particular attention; whereas, if he were not so engaged, he would become an object of observation to others; so that, instead of being the observer, he would become the observed; and, even if his nerves were good, and he were able to maintain his composure under these circumstances, he would entirely fail in his object, viz., that of seeing people as they are. This is rather a long digression in favour of the use of tobacco; but I can assure you it is one which those of your readers will do well to remember who propose

to travel in foreign countries; at all events, I can say with certainty, that it saved me from being, on many occasions, drawn into a conversation, which would inevitably have led to my being recognised as a foreigner, from my imperfect acquaintance with the Japanese language. I had, by hard study, and constant instruction from Dsetjuma, become sufficiently acquainted with his language to comprehend whether an observation addressed to me was a question requiring an affirmative or a negative answer: in the former case, I bowed slightly; in the latter, I shook my head; and where I had doubts, I made a compromise between the two, and puffed forth larger volumes of smoke, and looked graver than ever. The most trying time for me was when we stopped for the night at the place for public accommodation; because, having to sit for some hours along with numerous travellers, it was impossible that I could escape questioning, for there is no stiffness among these people, and no man hesitates for an instant in addressing any person who happens to be near him in a public place; and nothing else occurred to me to avoid this than to pretend that I was completely deaf. This *ruse* was successful, for nobody cared to talk to a man who could not hear a word that was said to him; at the same time, it was very unpleasant to be thus condemned to silence when I most wished to ask questions; but of two evils it was necessary to choose the least, and the least was certainly silence; for the best that could have been hoped for me, if it had been discovered that I was a foreigner, would have been my arrest, and being sent back to Nangasaki, while the worst was a consequence I shuddered to contemplate.

On the day of our setting out we did not stop anywhere to take pictures, because we did not wish to attract attention; and, certainly, the setting up of a camera so near the city would have insured our being surrounded by a crowd of curious spectators in a very few minutes.

(*To be continued.*)

Miscellaneous.

Photographic Society of Scotland.—According to a notice which will be found in our advertising columns, it will be seen that the fourth annual exhibition of the above society will be opened on the 16th of December, 1859, and will be closed in February, 1860. All descriptions of photographs will be admissible. Each picture should be framed and glazed, with a margin not exceeding two and a half inches in width all round, and in the case of pictures smaller than 9 × 7 inches, four should be in one frame; but a frame containing more than one picture must not exceed twelve square feet in area. Each picture must have written distinctly on the back the name of the subject, the artist and owner, the process, and, if for sale, the price. Exhibitors are requested to be careful in specifying the particular process by which their pictures are taken, in order that it may be inserted in the catalogue. Pictures touched by the brush will not be admissible, unless so described. Two silver medals will be given for the best two pictures in the exhibition. One of them to be given for the best portrait or group, and the other for the best photograph of any other subject. The Maconochie Welwood Prize of £10, to be competed for by professional members of the society only, will be awarded for the best photograph, other than a single portrait. The same picture cannot be put in competition for the Maconochie Welwood Prize and for the Society's silver medal; and pictures in competition for any of the prizes must be untouched by the brush, and must be exhibited by the artist himself. Any further particulars may be obtained on application to the honorary secretary, C. G. H. Kinnear, Esq., 49, Northumberland Street, Edinburgh.

Method of Reducing Chloride of Silver—We have at different times given various methods of reducing chloride of silver to the metallic state; one has been recently proposed by Mr. Muller, which will be convenient for those who possess a Bunsen's pile in good working order. The chloride of silver being washed and dried with care, then fused in a porcelain crucible, which is filled with sulphuric acid diluted with water; an electric current from the negative pole of the pile is passed into the acid liquid, the positive pole being in contact with the chloride of silver. By this means, not a particle of the chloride escapes decomposition, and the operation is finished when the whole has assumed a metallic appearance.

Photographic Notes and Queries.

GUTTA PERCHA BATHS AND DIPPERS.

Sir,—In the interesting article entitled the "Amateur Mechanic," in No. 56 of your journal, the talented author seems disposed to think that the aceto-nitrate of silver cannot in any degree affect *pure* gutta percha. Now, *is* there such an article in the market? Are all the articles manufactured by the Gutta Percha Company, and bearing their stamp, made of the *pure* material? I confess that I am afraid to give an opinion on this subject. But this I will say without fear of contradiction—for I am in a position to prove my assertion—that I have by me two gutta percha baths and one dipper, which, from the many serious inconveniences they have occasioned me within the last few weeks, I have at last abandoned. After having written so strongly against gutta percha baths, the world will judge harshly of me for again using them, but the fact is I only employed them for a temporary purpose, when I had not a glass bath at hand; and the result was, that after wasting nearly a whole day in useless endeavours to make one or other of the baths answer my purpose, every negative which I obtained was utterly worthless. Nor did I attribute the fault to the gutta percha without having thoroughly proved that it was unmistakably the seat of evil. Every plate, after I had developed it, exhibited *myriads* of small transparent spots all over it, even a few minutes after I had filtered the exciting solution. Finding that the first gutta percha bath was useless, I tried another which was nearly new, and, to my great mortification, with *exactly* the same results. Moreover, the exciting solution, when decanted into a bottle, had a strong odour of gutta percha. Now, this solution was newly prepared, and only contained a few drops of glacial acetic acid. In despair I endeavoured to get a glass bath, but could not obtain one at either of three shops that I inquired at. I finally purchased a porcelain bath, and immediately filtered the solution once more, and, to my delight, the first picture was perfectly clear and faultless. Now, this being the case, I opine it would be worse than madness to attribute the spots referred to to any other cause than the gutta percha bath. However, another proof is on the wing. After I had taken several negatives, I discovered that the same spots were *again* beginning to show themselves, even in the porcelain bath; but I was not long in finding out the cause of this. I had been using—without thought, I confess—the *gutta percha dipper*.* To this, then, I must attribute the cause of the present mischief. I, therefore, at once employed a glass dipper, and from that moment all has gone well. If any one would wish to behold a photographer's curse, that same dipper—independent of the bath—is a picture of one. I examined it the other day, when I had leisure, and, to my astonishment, I discovered that it was coated with metallic silver all over, and so thickly coated, too, that it required good hard scraping to remove it, whilst nitric acid would remain for some little time upon it before it entirely dissolved the silver. I have no doubt whatever that the interior of the gutta percha bath is in the same condition, and, when the dipper is moved up and down, small particles of metallic silver become dislodged, and fall upon the plate, thus preventing chemical action upon the spots formed, which eventually causes them to assume the transparency when the plate is developed. A few days after I had transferred the exciting solution to the porcelain bath, I was surprised to discover a dark coating all over the inside of the bath, and upon the glass dipper. This was probably either something removed from the gutta percha, or finely-

* Bearing the Gutta Percha Company's stamp.

reduced silver, caused by the action of the solution upon the gutta percha vessel.

Further, I can mention the name of a photographer in Regent-street who has at all events *three* gutta percha baths, each of which I have tried with similar results; and a well-known manufacturer of albumenised paper assured me that he was compelled to abandon a large gutta percha bath from the same cause—namely, that he could not obtain clear pictures with it.

It is highly important that this *questio vexata* should be settled. Of eight gutta percha baths which I have employed, but one of them has given pictures without the spots alluded to, and that one produced the fogging which I referred to in my article in No. 45 of the last volume of this journal.

In the art of electro-plating I have used a bath lined with gutta percha, and holding 130 gallons of silver solution, and in a few days the solution strongly acquired the odour of gutta percha, which, of course, was of no consequence; but, as I have before asserted, in reducing the silver from an old cyanide of silver bath, which had remained in the gutta percha vessel for a long time, and had ceased to work—when the sulphuric acid was poured into the solution to throw down the silver, the dissolved gutta percha rose in large clots to the surface, where it floated until it was finally removed and thrown away. This, I think, was evidence that the cyanide of potassium had acted upon the gutta percha itself. ALEXANDER WATT.

ARTIFICIAL LIGHT FOR PHOTOGRAPHIC PURPOSES.

SIR,—I am about proceeding on a tour to America, to join a party there, who intend visiting and taking the most celebrated scenery in the States and Canada. The great Mammoth Cave, of Kentucky, will receive our earliest attention. You may be aware this cave is several miles in extent, containing rivers, waterfalls, many lofty and extensive caverns, from 30 to 80 feet in height, but all in total darkness, and only imperfectly seen by the aid of torches, each visitor carrying one.

Can you advise any artificial light that would sufficiently illumine such an interior as would enable us to take views?

Would the light called photogen cast brilliancy enough over the scene, that negatives could be taken? V. C.

[We much fear that the photogen would prove inefficient under the above circumstances. Possibly, the best chance of succeeding would be to make use of the brilliant light emitted by burning phosphorus in oxygen. The camera could be arranged, and the lens and shutter opened, before producing the light, and then, when all was ready, several pieces of phosphorus could be burnt, in as many jars of oxygen, in different parts of the cave. Faraday has called this light the "sun in a bottle," and it well deserves its cognomen. A still more brilliant light, but a terribly expensive one, can be obtained by burning the new metal, magnesium, in oxygen. We have, for some time past, been experimenting on this subject, and hope shortly to be able to publish our results. A piece of magnesium wire, held by one end in the hand, may be lighted at the other extremity by holding it to a candle, as if it were a wax taper. It then burns away of its own accord, evolving a light insupportably brilliant to the unprotected eye, and possessing powerful actinic properties.—ED.]

CLEANING OIL PAINTINGS.

SIR,—In answer to your correspondent "Inquirer," I send the following directions for cleaning and re-varnishing old pictures:—1st. Commence by rubbing up the old varnish by friction with the fingers; when this is properly done the picture will be covered with a fine white powder, which is in reality the gum of the dried varnish; if the simple rubbing of the fingers is not sufficient, a little pumice stone grated over will soon have the desired effect. 2nd. Having wiped off the above-mentioned powder, next proceed to clean it; this is best done by rubbing a small piece of the picture at a time with a piece of cotton wadding wetted with a mixture of raw linseed oil and spirits of wine—they should be in two bottles, wetting the wadding by applying it first to the mouth of the oil bottle and then to that of the spirit; the spirit to be used is that sold by publicans, as great purity is not required. 3rd. Having cleaned the picture as above, the next process will be to varnish it; the best for this purpose is mastic varnish, which is to be spread on with a broad flat brush, made especially for varnishing. In this last process great care must be taken with regard to keeping away dust and hairs from the brush.

I can assure "Inquirer" that he will find the above directions efficacious, as I have seen many pictures cleaned and re-varnished in the same manner.

I take this opportunity of saying I have found burnt paper or rag excellent, where a very finely-divided carbon is required, such as for carbon printing, &c. E. M.

PINHOLES IN COLLODION NEGATIVES.

SIR,—In the directions which are given in your columns, for remedying the occurrence of pinholes and transparent spots in collodion negatives, one source of these annoying failures is, I think, in a measure, overlooked: I allude to the rubbing of the slide, which often takes place when the door is raised, if the woodwork be not accurately fitted. Lately it has been the fashion to French polish the inside of the door, and, in consequence, it is apt to become electric by friction against any rough point; I have seen showers of white spots like rockets so produced. There are, doubtless, many other causes of spots, but beginners will do well to examine the slide when they meet with the annoyance. Let them wipe it well with a cloth, rub the door with a piece of soap, and raise it gently, when the spots will often disappear. Spots produced by this cause will show more decidedly with some qualities of collodion than with others; nevertheless, the nucleus of the spot is frequently a particle of dust or resin, and is not derived from the collodion. The insertion of this note, if you believe it to be of practical value, will oblige, yours, most obediently,

F. HARDWICH.

THE TURPENTINE WAXED-PAPER PROCESS.

SIR,—When a sheet of waxed French paper is immersed in the usual iodising bath, containing iodide of potassium and free iodine, it becomes, as every photographer knows, of a dark purple colour, from the combination of the starch in the paper with the iodine in the solution. In the turpentine process of Sisson this does not take place, although, from the colour of the liquid, one might, *à priori*, expect it. This difference seems to point to some peculiar combination of the iodine and turpentine, which, in fact, appears to take place from the agitation that occurs on adding the iodine to the solution of wax in turpentine. An investigation of this might possibly lead to some interesting result, and I shall be glad to learn that some of your correspondents, better able than myself to examine it, have done so, or will undertake it. Every circumstance connected with the practice of our art is of interest, and this must be my excuse for thus pointing out what may appear trifling. ALIQUIS.

DEFECTS IN THE FOTHERGILL PROCESS.

SIR,—I have been lately trying to take some interiors, by means of Fothergill's process (Hockin's modification). My pictures have one serious defect, the windows being so dense that the lattice work or framing is entirely obliterated; and, moreover, on developing, a considerable deposit takes place around the windows for some distance, so as completely to spoil the result. What can be the cause, and how can these awkward results be obviated?

I may mention, that on trying the same subjects with collodio-albumen plates, I found nothing of the kind—no

diffusion round the windows; but I found also that by this process more time must be allowed, as the various objects in the room were much under-done with the time I had given to the Fothergill, and which in their case had been sufficient.

E. S.

PRINTING ON CALICO.

Sir,—I have been successful in producing a very sharp and strong photograph on an entire piece of calico of 8½ by 5½ feet; it is four times life size, but there are no distortions whatever. I have printed it by the solar camera and by the developing process in about ten minutes' time, but was obliged to stop the printing three times, as the sky was very cloudy on the 10th of September, at 12 o'clock. I believe it very useful to print on calico or any woven fabric, as a groundwork for oil painting, and I have made the experience that calico will print in half the time that paper does.

I have also printed a great number of portraits on large smooth Whatman's paper, which are now exhibiting in my gallery for life-size portraits, at Havelock Buildings, Bold Street, Liverpool—open for public inspection.

P. C. Stortz.

ANSWERS TO MINOR QUERIES.

On the Prevention of Blisters in the Collodio-Albumen Process.—To prevent blisters in the collodio-albumen process, M. E. Moxham advises the use of a pyroxyline, prepared at a high temperature, iodised with iodide of ammonium, with a few drops of liquor ammoniæ added to make it porous, and a separate bath for the collodion. To prevent the liquor ammoniæ from rendering the collodion rotten, it should only be added to as much of that substance as will be used in a short time. The strength of the bath should be 35 grains of nitrate of silver to the ounce. His method of testing the collodion is, to coat a plate, albumenise it, dry, and sensitise it a second time, and afterwards place it in a solution of common soda. If the film adheres so strongly to the glass as to resist removal by rubbing with the fingers, he considers it in good condition—otherwise, it will be a failure. To insure that the albumen shall fully permeate the film, he uses it very much diluted. He expresses a confident opinion that, if a sufficiently porous collodion be employed, and albumenised in a bath, with occasional movement—the albumen containing a proper quantity of sugar or honey—that no blisters need be feared.

TO CORRESPONDENTS.

Our next Number will contain a full account of the construction of a Photographic Glass House, *together with the Plans, Elevations, and Working Details, illustrated with copious Woodcuts.*

Cleaicus.—1. We do not think there is any practical advantage in employing iodide of calcium, over the corresponding potassium or cadmium salts. 2. We have never heard of the appearance of pinholes in the film ascribed to the use of methylated ether. Are you sure there is no other cause? Pin holes are frequently produced by the presence of carbonate in the iodide of potassium used for iodising: in that case a trace of free iodine is a remedy. 3. Iodise with an alkaline, in addition to a mineral iodide. Chloroform is of no use in our hands. If you attempt to remedy the gelatinisation of collodion by the addition of ammonia, you must take care that there is always an excess of ammonia in the bath.

H. B.—Your packet of diagrams and prints has arrived safely. The latter are not very good, the fault being too little vigour. This can be remedied by increasing the strength of the nitrate of silver bath, and then you ought to print some excellent pictures, as the negatives seem very excellent ones. Your description of the camera will occupy more room than we can at present spare; but in a short time we will see if extracts cannot be given of those parts likely to be most useful to our readers.

P. Atherton.—You have added so many things to your bath that we fear it is spoiled; however, you can try the following plan:—Boil it in a glass flask for about half-an-hour, with a few grains of metallic cadmium, then add a weak solution of carbonate of soda, drop by drop, till a slight permanent precipitate is formed, and filter. Then add a few drops of acetic acid, and see if you can take a good picture with it; it will, in all probability, work properly.

Photo. Beyond Railways.—1. Since the paragraph on a lead-colouring bath was written, it has been found that the pictures so toned are liable to fade; we therefore cannot recommend it. You will, however, find that the method of toning with alkaline chloride of gold, as given by "Θ" in the second number of our second volume, will give you excellent results. 2. The effect of the gum arabic which you mention is most curious, and deserves further investigation. Was the gum at all acid?

T. H., Junr.—The stereograms of Ramsgate, &c., are not very good, as the two pictures are not taken simultaneously, and the objects are in different positions in each. The sky also has been painted out in a very indifferent manner: altogether, they are not quite up to the mark. There are difficulties in the way of carrying out the second subject; we hope, however, soon to see our way to publish the proposition.

R. Beck.—You must not have a photographic lens on the camera when it is attached to a telescope for the purpose of astronomical photography, but the image formed by the object glass must be received direct on to the focussing screen. The proper focus must be found out by experiment. We are glad you found the photoglyph bear the high magnifying power so well; that extreme minuteness is the chief value of the process, in our opinion.

W. W. W.—We are sorry that you do not agree with our remarks. We only consented to interfere in the matter at the express wish of many of the members. Your pictures are very good, and we should think that any gentleman would be glad to exchange with you. If, however, you find them more exclusive than you desire, we shall be glad to receive your name for insertion in the list.

P. Y. G.—We do not think that liberty could be obtained at present for publishing the pictures; if, however, you succeed in doing anything very superior, and would forward a copy, we will make inquiries. A copper-plate can be ground down and repolished at a trifling expense, or you could do it yourself without much difficulty.

A. K. wishes to know if he cannot obtain mats of a circular shape, instead of the usual dome, cushion, and oval. We have seen circular mats at many large dealers, and have no doubt that an application to one of the firms to be heard of in our advertising columns would be rewarded by meeting with the desired article.

A. Taylor.—We do not think the colours of your pictures would be much liked. Try "Θ's" process again, and do not keep the print toning so long; by that means you will avoid the disagreeable blue black colour. We shall be glad to see what success you meet with, as your negatives are very good, and shall also be pleased to hear more about your revolving stereoscope.

B. Jones.—We do not see anything improbable in the statement commented on. We consider that the expression "old filters, cuttings of prints, &c.," meant the usual collection of a photographer's residues, and in that case the account is probably as correct in fact as it is in theory. We are acquainted with the address.

W. E. Maddock.—1. You should have poured the solution of chloride of gold gently into the large quantity of hypo. and it would have been all correct; but chloride of gold is decomposed with precipitation of black sulphide of gold, if it meets with only a *small quantity* of hypo. 2. Cyanide of potassium is the best thing, but it may injure the colour.

J. T.—You can take several pictures on the same plate, by uncovering a portion of the plate at a time, and, after exposing it to the object, moving it sideways, as in a single-lens stereoscopic camera, and taking another picture, and so on; or you can have as many lenses as you desire to take pictures, each opposite a separate portion of a large plate.

Constant Reader.—Toning with platinum is still very little practised, although we are of opinion that equal beauty of result, and permanence, can be obtained by its means as by the employment of gold. We cannot point out any particular formulæ to adopt beyond those published in our last volume.

A Subscriber.—1. Treat your bath as recommended to P. Atherton. 2. A day beforehand. 3. German paper; the price will depend on the quality. 4. Do not prepare much at a time; it will keep for several days. 5. Yes; quite as good.

T. A.—Twilight is not entirely caused by refraction, but by the reflection of light on to the earth, from the higher regions of the atmosphere upon which the sun is still shining. We shall be glad to hear further on the subjects alluded to in the letter.

W.—The spots will most likely disappear if gently rubbed with the tip of the finger. The plate has contracted dust on its surface. A well-prepared collodio-albumen plate ought to keep in perfect order for a month, if preserved free from light, or injurious emanations.

An Invalid.—A varnish composed of amber dissolved in chloroform would be free from the objections you state. It has an agreeable smell, and dries without the application of heat.

J. L.—Your picture does you great credit, and is quite good enough for us to insert your name in the next list. All you want is practice, to enable you to take pictures equal to any.

A Young Photographer.—1. We cannot advise further than by referring to our advertising columns. 2. It is now being published in the "Photographic News." 3. Some time early next month.

R. L.—We were exceedingly gratified to receive your admirable description; it will be a boon to many of our readers.

A Subscriber.—See vol. i., p. 81, for a good formula for a "redeveloping" solution to produce alabastrine photographs.

J. H.—You will meet with more success by following the collodion process as described in our recent numbers, commencing with No. 53.

One, will see, on referring to the commencement of our "Answers to Correspondents," that our next number will contain what he asks for.

T. Collins.—Apply to the secretary, or the manager, at the South Kensington Museum.

D. M. Allison.—The plan you forward has already been published in the "Photographic News."

R. S. B.—The pictures are not so good as we should like to see them. Your name shall, however, be inserted.

Another Constant Reader.—The effect alluded to has been fully discussed and explained in Mr. Watt's articles in our recent numbers.

C. C.—We should say, from your description, that the plate was much over-exposed.

G. J. T.—1. We should like to see some specimen of the results of the process you speak of so highly. 2. Two thicknesses of black calico.

Theodore Köbealein.—You will find all the desired information in our first and second volumes.

Mutual.—The plan is now under consideration.

N. E.—We will send them, if reminded of it at the time.

Falcon.—A pair of 4½ inch aplanatic.

Euphos.—We do not think you can do better than obtain the lens you mention.

E. S.—T. W.—Received.

X. X.—The letter has been forwarded.

Communication declined with thanks.—A. B. Y. Z.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—Gamma.—R. S. P.—An Amateur.

In Type:—M. Léon Foucault.—M. Van Monkhoven.—H. M. Brackenridge.—M. A. Root.—J. S.—G. H. W.—Nemo.—J. H. H.—M. M. D.—J. Walter.—H. M.—W. W. Hughes.—Alex. Henderson.—C. Craig.—N. Ennel.—An Amateur.—I. B.—R. J. Fowler.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 59.—*October* 21, 1859.

THE CONSTRUCTION OF GLASS ROOMS FOR PHOTOGRAPHIC PURPOSES.

The principle on which these rooms are constructed is in portable divisions; each division for sides and ends of rooms is 7ft. high and 3ft. wide; each division for roof is also 3ft. wide (or very nearly so, as will be explained by-and-by), and of a length to suit the size of room required. I may here remark that the divisions are the same for both kinds of rooms, figs. 1 and 4, and also that the letters for reference correspond in each. Each division, then, is a frame similar to E, fig. 2, of wood, 3½in. × 2½in., this size being adopted on account of its being so readily cut from a batten, which is 7in. × 2½in.; and also from its being sufficiently strong for the intended purpose. This frame can either be boarded over on the outside, as A A, with one inch deals, groved and tongued, or windows can be inserted in a part of the frames, as W W, fig. 5, for light, or for exhibiting finished pictures; or, where the dark closet is required to be in the same room, with windows as F F, fig. 4, or with glass, B B, figs. 1 and 4, the frames for sides and ends of both rooms being exactly alike in size, the door, with its frame, can be inserted into any part of the room; the door and frame, or those frames having windows, may be removed from one part to another, and exchanged with equal facility.

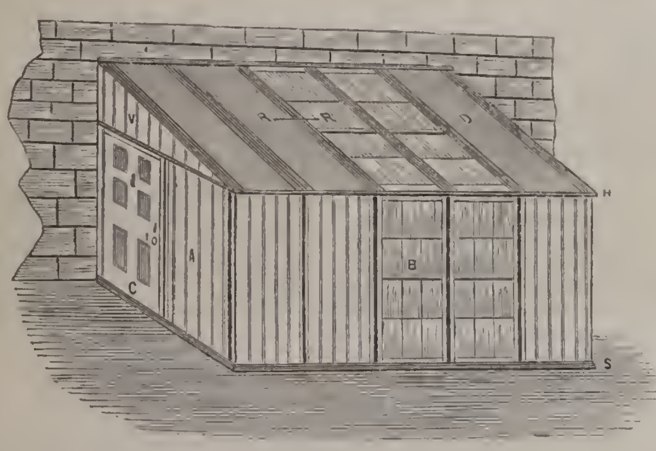
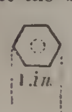


Fig. 1

Is an isometrical drawing of a small glass room (with a T fall roof) 15 feet in length and 6 feet in width, built against a house or garden wall.

The frames or divisions are then bolted together, and these to the bottom frame or sole piece, as shown in fig. 2. The bolts are all about 5½in. long, ⅝in. diam., with canted heads and nuts, 1in. wide and ⅝in. thick (as here shown); each bolt has two washers, to prevent the head or nuts damaging the wood when screwed tight up.



The sole piece or frame, S S S, is made from battens, 7in. × 2½in., the end pieces being morticed in, and where a floor is required, as in the style of room fig. 4, the joists for supporting the floor (also cut out of battens, are 3½in. × 2½in.) are morticed into the side sole pieces, as shown in fig. 7; the boards are nailed to those joists in 6 feet divisions or 3 feet divisions, according to fancy, one side of each division being fastened to joist with screws, X X, fig. 7, so that the floor can be taken up and removed with the same ease as the sides or ends of the room, and in pieces not too heavy for a man to handle with comfort. Y Y are bolts ⅝in. diam., to go through the bottom frame immediately under the floor, to hold it firmly together; they have nuts at both ends, of a similar shape as the other bolts, and one bolt at every six feet is sufficient.

The end pieces, V V, figs. 1, 4 and 5, are made separate: that is, *each* end in one piece, and bolted to the end divisions in the same way as the side pieces are bolted to the bottom frame.

The roof divisions are similar frames to the side divisions, and covered, first, with ½in. boards, with groved joints, and then a second layer of ½in. boards, with groved joints, the first layer to be well painted as the second layer of boards is being put on, so as to make it water tight. The joints of the two layers, of course, must be off and on, as shown in fig. 3, which is drawn to a scale of 1in. to a foot, to make it quite distinct, all the other plans being a ¼in. to a foot. I think this mode of making the roof portion of the "glass room" preferable to making it of only one layer of boarding, say ¾ or 1in. thick, and then covering it with felt, canvas, or other material; and I think, also, that it looks much better. The boards ought to be kept narrow, say 6in. each, so that the sun will have little or no effect on making them pine in or split.

With regard to the glazed portion of a photographic glass room, the little experience I have had leads me to think that two of the divisions glazed at side and top, as in the drawing, give ample light for the purpose. In the room fig. 4, the opposite side and roof are glazed also, to correspond with the glazed part seen in the drawing, and I think it absolutely necessary to carry the side glass down to the level of the floor to light the lower part of the sitter equally, and to prevent that portion of the picture from being dark and indistinct. I have found this out from experience in my own room, where the side glass only comes half way down. In the room fig. 4, a curtain can be used to shade off the light at one side and top, as required. I would not recommend the glass panes B B to be too small—those in the plan are about 18in. by 10in. My own room is glazed with ordinary crown glass, but, if erecting another room, I would put in colourless sheet glass. Should the side of room be next a street or road, to prevent passers-by from looking in, the panes can be done over with a mixture of whiting and water (this is easily washed off and renewed when required). I made the mistake of doing mine over with light blue *paint*—this stops too much light; or, part of the frame may be glazed with rough plate glass, the threaded or small diamond pattern will answer equally well, and look very much better. No doubt you will have seen many office windows in towns having the diamond pattern glass in the lower sash; this plan will save the painting or white-washing.

The top frame H H is a light frame, 7in. × 1¼in. (a batten cut in two), and is fastened to the top of the side

and end frames with screw nails; this frame projecting 1½in. or so on each side of side frames; on this rests the

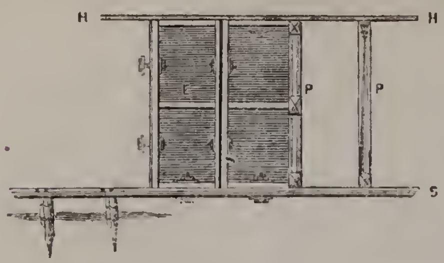


Fig 2

Shows how the frames or divisions are bolted together, and how the divisions are bolted to the bottom frame or sole piece, and also how the sole piece is bolted to small posts driven into the ground, in order to keep the room firm and secure against wind.

ribs or couples, which are morticed to it, as in fig. 6; the iron bar is also clearly shown in this section, it is fastened to the *ribs permanently* with screws; the bar is about 2in. wide and ¼in. thick; the ends, when each pair of ribs is dropped into its place over the centre of each division, are fastened to the side divisions with screws, as K K, or, if thought proper, a bolt, ⅝in. diameter, passing from side to side and through the side frames, with a nut at each end, will answer the same purpose, viz., to keep the side frames perpendicular and prevent them bulging out with the weight of the roof.

In fig. 3 is shown very clearly the form of the ribs or couples, which are the same as are generally used for greenhouses; the top frames are shown in their places with a piece of wood, L, to form a cap to cover the two joints; should any rain be blown in underneath, it finds its way down the side to a little gutter under the top frames, and so runs off the roof; these little gutters are seen in fig. 3.

It was mentioned nearly at the beginning of this description that the top frames were each 3ft. wide, *or nearly so;* the slight difference in width is caused by the ribs projecting upwards to the level of the roof, as at O in fig. 3; this is to form the parting between each division and keep them steady; it is about one inch wide, so that half an inch is planed off each side of top divisions, to allow for this projecting rib, and also to allow of the cap L covering the two joints, to be screwed to the ribs.

Where the frames are bolted together, a piece of wood (similar to the cap L in fig. 3) is put over the joint, to make a neat finish, as at R R, in fig. 5.

The double lines in the side divisions, see A A, are intended for the narrow bead that joiners generally run along the joints of boarding; it is not necessary, but it makes the work look better.

There ought to be a ventilator in each end of house, V V, figs. 1 and 4. Those can be bought at any ironmonger's, ready for fixing, in a variety of shapes and sizes, and in cast iron or brass.

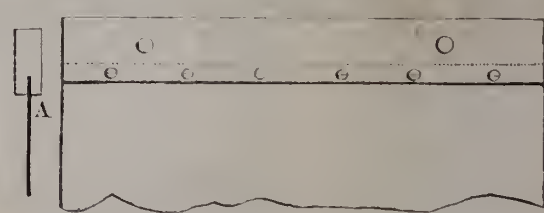
I cannot say whether a circular roof for a photographic glass room is any better than the ordinary roof, as I never tried it, neither have I ever *seen* one circular; but I think the difference will not be so much in favour of the circular form as to warrant any parties going to the extra expense, for it will cost at least one-half more than the plain ridge and furrow roof, if not *double* the price.

CONCLUDING REMARKS.

The principle on which the rooms shown on the plan are built admits of their being easily enlarged or curtailed; the doors and windows also can be altered without much expense, and it admits of a good deal of ornamentation, if the taste of the proprietor inclines that way. The divisions require a piece of wood to cover the joint, and it can be made in a variety of ways (see P P in fig. 2); those ornamental pieces can also be put over the joints inside the house. The top frame projecting 1½in., inside as well as outside, allows of little brackets and columns being fixed, so as to have a good effect. The couples, too, can be made in a variety of ways to add to the elegance of the room. I thought there was no necessity to make drawings of these parts, merely as ornaments, but to leave this to the taste of the party building the room. The ends of room outside can also be ornamented (see fig. 5).

As to warming the room during winter, I would recommend, in all cases where gas can be had, to use a gas stove, it is so much cleaner than an ordinary fire stove; and as dust is one of the greatest enemies a photographer has to contend against, he had better go to the little extra expense at once, and get the gas in preference to the fire stove.

For a background I would recommend a piece of oil cloth, that which is used for the floors of rooms or passages; it can be had any size, and costs from 1s. 6d. per square yard and upwards; but the common kind answers for this purpose.



Get a piece of wood from the joiner, 2in. by 1in.; get him to plane a grove with his plough along one edge, as A, in sketch above, just to admit one edge of the oil cloth, and fasten it with screws; both sides can be painted and serve for two backgrounds; two holes cut in the piece of wood

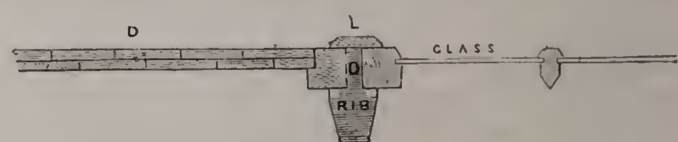


Fig. 3

Is a section of the roof and ribs at R R, drawn to a larger scale to show clearly the form of ribs or couples, on which the roof rests, and the mode of covering the wooden part of the roof

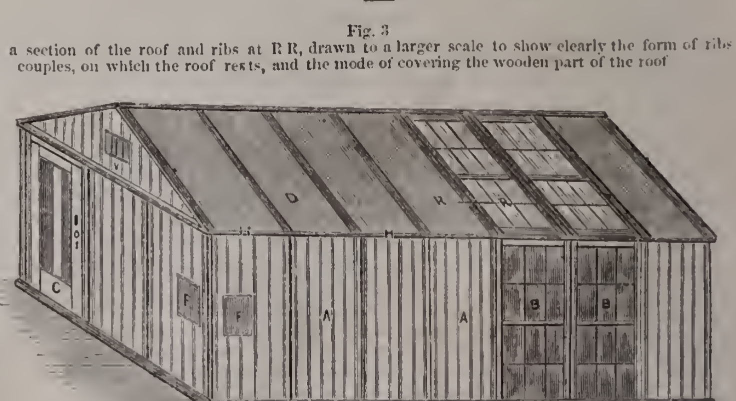
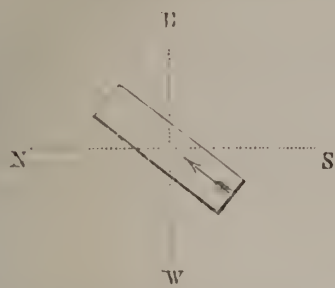


Fig. 4

Is a glass room, with a ridge and furrow roof, for erection in gardens or other places where a wall cannot be had: that shown in the plan is 21 feet long and 9 feet wide 7 feet high at the sides and 13 feet in the centre.

serve to hang it up by, on two large screws or nails; it will hang nearly as flat and even as if it was stretched on a frame. When you wish to change the sides, go in behind and turn round (face to oilcloth), lift it off the nails and turn round gently, and drop it on to the nails again; a white calico



background may be tacked to end of room, behind the oilcloth also, so as to have a choice of three backgrounds.

Regarding the position of the room, I see that arranged in a variety of ways at this day. I have had my room standing north and south, that is, length ways, and have also had it east and west; it is now standing the latter way; the sitter looks east. I would be inclined to put the house, if convenient, for the sitter to look north, 45 east, as shown.

I have not said anything regarding the cost of these rooms, as the price will vary in different localities for the same style of house, but should you think fit to insert this communication in the "PHOTOGRAPHIC NEWS," or as much of it as you think sufficient to explain the construction, with woodcuts from the drawing, then I would suggest that any person wanting one built should take the "NEWS," and go to any respectable joiner, and tell him what size he requires the house; he will, from the plan and description there given, be able, in a short time, to tell him the exact cost, without much trouble to either party. I think this will be a more satisfactory plan than attempting to give a detailed account of the cost; but, as an example, I may state that my room, built similar to the one in plan fig. 4, with floor, and painted once over—the room being 18ft. long, 7ft. wide, 7ft. high at sides, and 9½ft. in centre—cost me a little over £30. R. L.

Fig. 5.

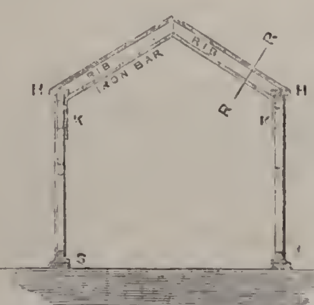


Fig 6.

Fig 7.

Fig. 5 is an end elevation of room fig. 4, showing how different styles of windows and doors may be inserted in any of the divisions as may be required; or those windows may be used as show frames for exhibiting specimen pictures, cases, frames, &c., by having a door or shutter hinged behind the window.

Fig. 6 is a section of room fig. 4, showing the ribs, which support roof, and the iron bar screwed to ribs, to stiffen or keep firm the whole room, and to prevent the sides bulging out with the weight of roof.

Fig. 7 is a ground plan of part of the sole piece, or bottom frame, with one division of the flooring, should it be required.

THE FRENCH EXHIBITION.

THE following remarks on some of the prints in the French Photographic Exhibition, condensed from the *Revue Photographique*, may be of interest to our readers, as they refer to pictures obtained by peculiar processes described in this journal. Thus, M. Corbin exhibits some fine proofs printed from collodionised paper negatives obtained by his process, given in No. 16 and two following numbers of the "PHOTOGRAPHIC NEWS." M. Brebisson exhibits seven pictures printed on paper sensitised with nitrate of uranium, which are described as being in no way inferior to those printed with chloride of silver. Three other proofs are exhibited from the same negative—one of nitrate of uranium, another of chloride of silver, and a third of carbon, which are so nearly equal in quality that the critic finds it difficult to form an opinion as to which is the best of the three. It happens, however, that the subject is one calculated to show the carbon process to the greatest advantage, being a picture of some rocks. With respect to Messrs. Salmon and Garnier's, and Mr. Pouncey's carbon proofs, the *Revue* says, "Messrs. Garnier and Salmon expose a collection of carbon positive proofs which promise well; the half-tones leave something to be desired; the gradations are feeble; nevertheless, such as they are they are worthy of remark. Mr. Pouncey's proofs are inferior to those of Messrs. Salmon and Garnier, the whites are generally dirty, and the half-tones badly preserved." M. Lafon de Camarsac exhibits some portraits on enamel which, for obvious reasons, are both good and interesting. M. de Sevastianoff exhibits photographs of manuscripts of the eighth, twelfth, thirteenth, and fourteenth centuries, taken by him on Mount Athos, which we hope will figure in our next exhibition, as they are said to be of great interest in an archæological point of view. Another interesting series of prints are those by Mr. Graham of scenes in the Holy Land, something like thirty in number, including Mount Moriah, the valley of Cedron, David's sepulchre, Absalom's monument, the Mount of Olives, &c. While M. Bertsch exhibits prints of animalculæ enormously magnified, M. A. Wagner exerts his ability in an opposite direction; he exhibits microscopic pictures of objects which are really astonishing; one of these is a reduced photograph of the proclamation of the Emperor of the French to the French people at the outbreak of the last war. This proclamation contains 2,649 letters, all of which can be distinctly read with the aid of a suitable magnifying power, although they are included within a space of two millimètres square.

M. Testud de Beauregard is said to have obtained photographs in natural colours of flowers, by simple exposure to the light; for example, roses, pale violet, and green, produced without the aid of the colourer.

ELECTRICAL PHENOMENA PRODUCED BY LIGHT.

M. Edmond Becquerel has recently published in the *Annales de Chimie et de Physique* the following results that he has arrived at in the course of a lengthened investigation on the above subject:—

1. When two plates of platinum, immersed in a liquid conductor of electricity, are connected with the two poles of a very delicate galvanometer, and one of the plates is exposed to the action of the solar rays, an electric current is immediately excited and rendered evident by the galvanometer and ceases when the luminous rays cease to fall on the plate. A similar effect is produced by allowing the light to fall on the other pole; the direction of the current as well as its intensity depends upon the acid or alkaline nature of the conducting liquid.

2. The electrical effect depends probably upon a special action exercised by the rays, and not upon any elevation of temperature which might result from the solar rays heating the platinum plates unequally; for the action of the different parts of the solar spectrum, as well as an analysis made with screens of coloured glass, show that the effect is due to the blue and violet rays of the spectrum and not to the red part.

3. When the plates of platinum or of gold are very clean, and have been heated to redness and plunged into nitric acid several times, the electric action is much diminished, but is not altogether destroyed.

4. Other metals besides gold and platinum, and especially alterable metals, such as brass and silver, give rise to similar results; moreover, the previous polarisation of the plates, especially if they have been touched with the positive pole of a battery when immersed in water, may much increase the observed electrical effect.

5. If on the surface of the plates there be placed bodies capable of undergoing decomposition by light, such as chloride, bromide, or iodide of silver, &c., an electric current will be observed as soon as the light acts, which may even be very energetic. By operating in another way, and coating the plates of silver with a film of iodide, bromide, or chloride, by the direct action of the vapours of these bodies on the metal, and by exposing one of these plates (always prepared in pairs, and in a similar way) to the action of the light, the electrical effect is much increased. This last arrangement is, in fact, the one on which is based the electro-chemical actinometer.

In conclusion, the whole of these researches having led me to think that, in the case where the rays act simply on metallic plates, the calorific action produced by the rays is not the cause of the evolution of electricity I have imagined that possibly this disengagement might be due to a chemical action exerted on the extremely small atoms which adhere to the surface of the plate. I have even stated (Thèse du 4 Août 1840, p. 31), "It may still be asked whether the acting rays produce an alteration on the platinum under the influence of foreign bodies, or whether they occasion a change in the state of equilibrium of the particles on the surface of the metal? This is a question which has hitherto remained unanswered."

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS.—GLASS NEGATIVES—(*continued*).

The *negative bath* is to be made as follows:—Weigh out nitrate of silver, four drachms. Dissolve in about an ounce of distilled water. Next carefully weigh out iodide of potassium one and a half grains. Dissolve this, with half a drachm of distilled water, in the drachm measure, previously well washed. When dissolved, pour it into the concentrated solution of nitrate of silver; at first a yellow precipitate of iodide of silver will be formed; the mixture should then be stirred with a glass rod, when the solution will become clear again—the nitrate of silver having redissolved the iodide of silver. Now dissolve a few grains, say five, of carbonate of soda in half a drachm of water. Pour this into the nitrate solution and stir again: the solution will become slightly turbid. Then put the solution into the clean 12-ounce bottle, and add to it seven ounces of distilled water. This will give a milkiness to the solution, which must be removed by filtering, as directed previously, when forming the positive bath—the solution being allowed to run several times through the filter, until it passes through perfectly clear; it may then be filtered into the bottle which is destined to contain it, and this should be labelled "Negative Exciting Solution." Three drops of glacial acetic acid must now be dropped carefully into the solution, and it will be ready for use.

The negative developer consists of—

Pyrogallic acid	1 grain.
Glacial acetic acid	10 minims.
Alcohol	10 „
Water	1 ounce.

Dissolve the pyrogallic in the water, and then add the alcohol and acetic acid. As this developing agent will not keep longer than a day or two, it will not be advisable to mix more than is likely to be required for a day's work at a time—say four ounces or so, which, when the small sixth-size glasses are used, will be sufficient to develop at least a dozen pictures. The bottle containing the developing solution should be labelled "Negative Developer," and should be kept for that purpose only.

The *fixing solution* for negatives is the same as that used for positives, except that it is required to be a little weaker for the latter. The formula given for positives, however, will do for either.

When it is inconvenient to obtain distilled water, common water may be used for making the bath, and I have never known any injury to result from its employment. However, it is advisable, as these operations are of an exceedingly delicate nature, to employ distilled water, if it can be procured conveniently, and all the chemical substances should be obtained from some respectable establishment.

The collodion being the most important item employed in photography, must be of good quality, as the beginner is more likely to fail, from using an indifferent collodion, than from any other cause. Some of the collodion at present in the market is the vilest trash that ever bore the name of collodion. I have lately tried an article which was strongly recommended to me, and, to my infinite horror, I found it so unsensitive that a decent picture could not be obtained with it, on a bright day, in less than a minute, with full aperture of the lens; and the shop from which I obtained the collodion referred to was well stocked with this indifferent material. It was probably a very decent article when first made, but I cannot understand why shopkeepers are so mad-brained or so careless as to keep a large stock of iodised collodion in warm weather, when it is well known that it loses its sensitiveness every day. These remarks do not apply to those collodions which are iodised with cadmium, instead of potassium or ammonium—the former keeping good for months, whilst the latter will not remain sensitive for more than as many days. My reason for making these remarks, *en passant*, is to put the student on his guard, for I well know what disappointment will necessarily arise if he obtains a collodion which he cannot work with. In order to be able to depend upon producing satisfactory results, I should certainly recommend the beginner to procure the collodion from some house of well-known respectability. Sometimes collodion, when not procured direct from the maker, is improperly iodised, in which case the article, otherwise good, is rendered unfit for use. I have sometimes obtained collodion from a shop near at hand, and have been unable to use it, whilst that which was purchased direct from the maker was excellent. The iodising of collodion is a very important matter, but it is too often left to inexperienced persons to perform. After having acquired a thorough knowledge of the manipulatory details of photography, the pupil may next turn his thoughts to selecting a collodion which he himself may prefer to work with, and which may answer his purpose in quality or price; at present, however, it will be advisable for him to keep to the same collodion for awhile, unless he has reason to suspect at any time that its qualities are inferior.

Hereafter we will give the student the necessary directions

for making collodion for himself, if he desires to do so, but as it is a troublesome and very uncertain manufacture—depending upon great skill and experience—it will not be well at present to enter into the manufacture of this or any other of the substances used in photography.

Presuming that by this time the beginner is well acquainted with the art of focussing, and the general manipulations of the camera and the dark room, let us now draw his attention to those considerations which are involved in the art of taking negatives.

In the first place, the exposure of the plate in the camera will require to be at least twice as long as that generally required for a positive taken with the same collodion and bath. That is to say, if the plate, when it has been exposed in the camera, and after developing and fixing it, looks like a positive—and having no greater density than one—the next plate, taken under similar circumstances, must be, to render it a negative, exposed twice as long as the first to make a negative of it.

Again, the development of the image must be carried to a greater extent than in the case of a positive, where the process is checked the moment the details of the picture are brought out. In fact, in developing negatives, the process must be continued until all the whitest parts of the picture appear black. The operator must bear in mind, that that which appears black in the negative, will be white in the positive print which is to be obtained from it, and as this will depend upon the extent to which the negative has received the deposit of silver in developing, the operator must be sure that the picture is developed sufficiently.

On the other hand, it is possible to carry the development too far, more especially when the picture has been under-exposed, in which case the high lights will from the first become very black, and, if the developing agent is applied to any great extent, the resulting print will exhibit an ugly jump from black to white, without those intermediate half tones which give harmony and beauty to the picture, and without which it will look hideous. But if the plate has been over-exposed, and the development be carried to a great extent, it is quite possible that you may never be able to obtain a print—even in the direct sunshine—of all its details, many of the principal features having become obliterated by the silver deposited upon the impression.

Generally speaking, a negative should appear, when you look *through* it, dense and black in the lightest parts of the picture; and those points of detail which stand between the lightest and darkest parts in depth of tone—or "half-tones," as they are called—should appear one degree less dense, or a greyish semi-transparent tone; whilst the shadows, the black parts of the original, should be perfectly clear as the glass itself. On looking *at* the picture, that is, by reflected light, sometimes you may not be able to see the features, if it be a portrait, or a copy of a picture with figures, and the shadows will be so clear, that you will be able distinctly to see the hand, or any white substance, through the glass. In fact, you should be able to read through the clear parts of the picture.

Sometimes, however, it will be necessary so far to over-expose a picture, that you will not be able to recognise any object through it, and yet it will yield very beautiful proofs. These are matters which it will be necessary for the student to bear in mind before he proceeds to take a negative, in order that, when he has taken one, he may be able to tell whether it is satisfactory, or otherwise; in fact, he must be able to judge whether he is working properly or not, by bearing in mind the points referred to, whilst practising the art of taking negatives, the details of which will be more fully entered into in the next article.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued.*)

The sealing or closing of glass tubes is effected by a somewhat similar process to that of drawing them out. Tubes so closed at one end are constantly of service in conducting chemical experiments, as in case of test tubes, &c. They have been recommended, and will be found very useful to the photographic tourist, for preserving small definite quantities of various chemicals for use when travelling. The chemicals—such as are required for developing solutions, for instance—are to be weighed out in quantities sufficient for a given amount of water, before commencing a journey, and put up in small tubes sealed at one end and corked at the other; they are then ready for use at a moment's notice, without any trouble of weighing, &c.

If several tubes of one size are required, a piece of tubing of the proper thickness is to be taken and marked with chalk in the required lengths. It is then to be held to the flame at one of the marks, revolving it, as we have before described, in the process of drawing out. The portion heated should be as little extended as possible beyond the mark, and the softening should be carried as far as possible before drawing out. When sufficiently heated, it is to be rapidly drawn out and divided, when two pieces with sealed ends will be obtained, the shape of which will be something like the adjoining diagram.

The fine point is now to be again applied to the flame and rotated, when it will gradually fuse and assume the form of a small globule or button. A piece of small tube or rod is then to be attached to it in the flame, by fusion, on withdrawing which the button will leave the tube, which will be as nearly as possible round and smooth at the sealed point. To finish it in a perfectly workmanlike manner, it must be again applied to the flame, and air cautiously blown into the other end by the mouth, revolving it rapidly the while. By this means a perfectly round, smooth sealed end will be obtained. The sealed end will then be cut at the required distance from the long tube, by one of the methods which we shall in due course describe, and the other portions proceeded with in the same fashion as the preceding.

The mouth of each tube, which will at present possess a sharp and unfinished edge, will now require a little treatment. It is to be heated in a similar manner, taking care that only the extreme edge is softened, and a piece of charcoal previously fashioned into a conical shape is to be inserted into the softened orifice, turning it round until the edges are slightly flanged out into a shape like the annexed figure.

Where one end of a tube is to be sealed without dividing it, the end to be sealed must be heated in the flame, and another piece of tube of similar diameter must be similarly heated, and the two pieces united by the fusion of the ends. The tube to be sealed is then to be heated at a point immediately adjoining the junction, and drawn out as we have already described, being submitted, of course, in all respects to the foregoing treatment.

Piercing or boring holes in glass is effected in various ways. The most simple method is by means of a common steel drill, or even a brad-awl ground to a lozenge or drill-shaped point, so as to present some cutting edges. The point is to be kept wet with common turpentine, which will be all the better if it be allowed to resinify a little by evaporation, or the same end may be gained by the addition of a little powdered resin to the turpentine. If a piece of flat glass is to be pierced it should be placed upon a flat table covered with cloth or baize, so as to have a firm, even, and somewhat elastic bearing. The drill or brad-awl should be held lightly, and worked rapidly round on its point, which should be kept constantly supplied with turpentine. Heavy pressure would be apt to crack the glass, and is not at all necessary in boring it: a rapid, continuous, drilling motion is all that is required. In some cases the drill and bowstring (to be hereafter described) will be found valuable, and will effect the work more rapidly and safely than hand drilling. Glass stoppers broken into bottles may be removed by this method, a little time and patience only being necessary to perforate them sufficiently for easy removal.

If a hole require drilling in a glass tube or vessel of any kind, a little more care is required, because, if at all thin or delicate in construction, there is danger of breaking it. Care must be taken to hold it lightly, using as little pressure as possible, the hole being made by the rapid friction only. For this purpose it will frequently happen that the drill and bowstring will be found more efficient than hand drilling. It will be found useful, in order to facilitate the process of piercing glass, at all times to make a slight scratch or abrasion of the surface of the glass at the point to be drilled, with a diamond or a sharp file, in order to get a ready bite for the drill. It must be remembered that, unless the point is at all times kept well wet with turpentine, not only will the process be slower and mor

tedious, but the point of the drill will rapidly become dull and useless.

Before closing this article, we must be permitted, for one moment, to recur to the question of gutta percha. A recent issue contains an interesting communication from Mr. Alexander Watt on the subject, in which he remarks very truly that it is highly important that this *questio vexata* should be settled. There is, however, always a great tendency to settle vexed questions by going to extremes, and many photographers, reading Mr. Watt's sad list of calamities attending the use of gutta percha, will be tempted to exclaim, "If there is even a risk of encountering all these disasters in using gutta percha, we will abandon it entirely." In doing so they will, we think, most unnecessarily abandon the aid of one of the most useful materials the photographer possesses; unnecessarily, *because all risk may be avoided*, by adopting the precautions we have suggested in former articles, such as lining their gutta percha baths with glass; or, simpler still, using strong shellac varnish to cool the interior of the bath. This plan, we believe, answers perfectly. In answer to Mr. Watt's question, "Is there such a thing as pure gutta percha in the market?" we have no hesitation in answering in the affirmative. The fact that we have ourselves, in common with many others, used gutta percha nitrate baths for years, without injury to the solution, is, we think, sufficient proof. We have at present some sheet gutta percha, which we believe to be quite pure; a portion of it we shall be happy to place at Mr. Watt's service for experiment. In regard to the dipper of which Mr. Watt speaks, as bearing the stamp of the Gutta Percha Company, it is no part of our purpose to become the advocates of any trading company, but having, as we before stated, failed, after inquiry, to hear of any bath bearing such stamp injuring the contents, we have made some inquiry as to the purity of the material employed in manufacturing dippers. We have found, we think, a satisfactory explanation. Some time ago it was the custom of the company in question to make the dippers of gutta percha, mixed with some pigment to give hardness, oblivious of the fact that this might be injurious. Their attention was, however, directed to the fact, and the practice was abandoned. The dippers as well as the baths are now, and have been for some time, put forth as manufactured of pure gutta percha.

(*To be continued.*)

Photographic Chemistry.

THE METALLOIDS.—*Oxygen.*—(*Continued*).

We shall mention one other method of obtaining oxygen in a very pure state and with great facility, and then pass on to a consideration of its properties. Take a clean and dry Florence oil flask,* and put in it a small quantity of chlorate of potassa, a compound of chloric acid and potassa, chloric acid being itself a compound of chlorine and oxygen. Chlorate of potassa is readily decomposed by heat, all the oxygen it contains is liberated, and there remains a compound of chlorine and potassium—the chloride of potassium. On the application of heat to the flask the chlorate of potassa melts, and bubbles will be perceived to rise to the surface, this announces that decomposition has commenced; and as this proceeds the liquid gradually loses its fluidity, acquires a pasty consistency, and oxygen ceases to be given off, unless greater heat be applied. Towards the end of the operation the substance blisters, and separates from the bottom of the flask in places; consequently, care is necessary to prevent the temperature from reaching the point at which glass melts.

We have already observed that oxygen is colourless, consequently it cannot be distinguished from atmospheric air by its appearance. Its density is somewhat greater than that of the air, its specific gravity being expressed by the figures 1·1057 by some chemists, and by 1·1007 by others.

Oxygen is soluble in water only to the extent of about one twenty-fifth of its volume. Its combinations with metals is thus expressed: that having the most strongly-marked basic character is termed the *protoxide*, the next the *binoxide*, the *peroxide* indicating the compound containing the largest proportion of oxygen not having a distinctly acid character. If it happens, as it not unfrequently does, that there is a compound between the protoxide and the binoxide, containing two parts of the metal, and three parts of oxygen, it is termed a *sesquioxide*.

A great peculiarity of the gas under consideration is, that though it is itself incapable of burning, its presence is essential to combustion. To show how powerful its influence is in stimulating the combustion of bodies, take the wide-mouthed glass jar or bottle containing the oxygen resulting from the experiment described above, and substitute for the cork one to which a piece of stout wire is attached, having a hook at the end to support a porcelain capsule. In this capsule place a little piece of lighted charcoal and lower it into the jar, and the eye will be immediately dazzled by the brilliant sparks which fly from it in its rapid combustion. Take a lighted taper, blow it out, and lower it into the oxygen, it will burst into a flame again instantly. The most striking illustration of its qualities as a *comburant* may be given in the following manner:—Take a thin, narrow blade of steel, similar to that used for making watchsprings, and twist it like a screw; fix one end in the cork, and to the other end attach a bit of a lighted fusee, and plunge it into the bottle. The combustion of the fusee will become very vivid, and will set fire to the steel, which will burn with great brilliancy, and throw off globules of melted oxide of iron. It is advisable to pour a little water into the jar before performing this experiment, or otherwise it will probably be broken. If it be desired to produce the most vivid light possible, then a small piece of dry phosphorus may be attached to the wire, lighted, and lowered into the jar; so brilliant is this light, that no eye can bear it for more than a second or two.

These experiments prove that combustion is much more rapid in oxygen than in atmospheric air; and, indeed, as we shall prove presently, it is to the presence of oxygen in the atmosphere that combustion is owing. Hence it is termed a *comburant*—a term applied to a substance which supports, though itself incapable of combustion.

The combustion of bodies in pure oxygen produces a great increase of temperature in the vicinity of the combustion, which is also more energetic in a rapid current of air than when it is stationary, for the simple reason that a greater quantity of oxygen is in this case brought into contact with the combustible. It is on this principle that we construct bellows for smiths' forges, and so forth. Everybody is familiar with the action of a blow-pipe, but comparatively few may be aware that the increased intensity of the flame upon which it acts does not arise from the flame being blown in a particular direction, but because a greater amount of oxygen is brought in contact with it. The blow-pipe is a small metal tube with a conical hollow running through it, the top being bent at *right* angles, and tapering to a point. On applying the mouth to the larger end, where it is hollowed out for the purpose, and blowing through it, a current of air is directed into the body of the flame, which being in this manner supplied with a larger amount of oxygen, is proportionately increased in strength. To use the blow-pipe properly requires practice. The air should not be drawn into the lungs, or it will be deprived of so much of its oxygen, and be otherwise so vitiated, that it will, in itself, be of little use; but the supply should be drawn into the mouth through the nose, by means of the muscles of the cheeks, which can be accomplished with great facility after a certain amount of practice. As the proportion of oxygen in the atmosphere is only as one to four, it follows that the intensity of the flame may be greatly increased by passing a jet of pure oxygen through the blow-pipe in place of the atmospheric air. To accomplish this with facility, proper apparatus should be purchased, but a rough method of doing it is as follows:—Put a bladder into water until soft, then press out the air thoroughly, and insert the end of the tube belonging to the Florence oil flask, and attach it firmly so that no gas can escape; the oxygen, in passing from the flask, will enter and swell out the bladder. When this is full, remove the tube, keeping the mouth of the bladder downwards, and substitute the blow-pipe, which secure in the same manner as the tube. Put the nozzle of the pipe into the centre of the flame, and apply pressure to the bladder. The intensity of the flame is thus greatly increased, from the oxygen being brought into contact with the inside of the cone of flame, which, under

* Those of our readers who may prefer to buy the requisite vessels rather than take the trouble of preparing them for themselves, may readily obtain them by applying at any chemical glass warehouse.

ordinary circumstances, is hollow. The flame thus stimulated by the oxygen is capable of melting a wire of platinum.

Not only is oxygen essential to the maintenance of combustion, but also to the maintenance of life—animals placed in air from which the oxygen has been withdrawn dying in a very short space of time.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 18*th October*, 1859.

I REMEMBER well an interesting article which appeared in the "PHOTOGRAPHIC NEWS," some months ago, on *Cellulose* and its Solvents. The subject has likewise been mentioned in one of my former letters. The discovery of M. Schweizer, namely, that cotton may be dissolved in a solution of oxide of copper in ammonia, and be reprecipitated as pure cellulose, has led Dr. Bolley to make a series of experiments, which tend to throw much light upon the phenomena of the fixation of colours on tissues. The cellulose, precipitated from the cupro-ammoniacal solution, is completely without texture or amorphous—it may be termed amorphous cotton. It was then interesting to determine whether this amorphous cotton could combine with colouring matters and mordants in the same way as cotton tissues. M. Bolley has proved that such is the fact:—The gelatinous precipitate of cellulose takes zinc and alum mordants with ease, and can afterwards be dyed with cochenille, *quercitron*, hematoxylin, &c. Walter Crum's ingenious theory, that colouring matters adhere to tissues by virtue of a certain capillary attraction of the fibre, must then fall to the ground.

But now comes another consideration. This amorphous cotton (which presents the same chemical composition as the cotton before it is dissolved), after it has been mordanced and dyed, can be acted upon by the cupro-ammoniacal solution, *which dissolves the cellulose and leaves behind the colour and the mordant.* It is probable that this curious reaction might be turned to account in analysis; for instance, to determine the height of colour and mordant which adhere to a given amount of cotton. It seems somewhat in opposition to the opinion which holds, that colours and mordants are fixed upon tissues in virtue of a chemical combination; unless, indeed, cellulose, in dissolving in the cupro-ammoniacal liquid, form a true combination. I believe Dr. Bolley intends to publish a considerable work upon this subject.

The well-known mineralogist, Gustav Rose, has published a short note on the dimorphism of zinc. In certain cavities existing in two pieces of brass, which formerly belonged to the laboratory of the celebrated chemist, Klaproth, Gustav Rose remarked a metallic crystallisation, derived evidently from the cube. It appears, however, that the nature of these crystals was not examined very carefully, and maybe, they were not pure zinc. However, the fact is not new. Zinc has long been known as a dimorphous substance; it crystallises in two distinct forms, one of which belongs to the cubic system—the other, an hexagonal prism, belongs to the rhombohedric system.

The metals whose crystalline forms are known with certainty up to the present time, all crystallise in one or the other (rarely in both) of the two systems just mentioned. There is one exception, namely, tin, whose crystalline form is the square prism, a fact discovered by Dr. Miller, of Cambridge.

Here is the list of other metals that have been observed in a crystallised state:—

Rhombohedric Metals: Bismuth, antimony, arsenic, tellurium, *zinc*, *palladium*, *iridium*, and osmium.

Cubic Metals: Copper, silver, lead, cadmium, *zinc*, iron, mercury, platinum, *iridium*, and *palladium*. (This list is given by Rose; to it may be added potassium and sodium.)

M. Weber has published, in the *Annalen der Physik und Chemie*, an interesting paper on the combinations of bismuth and chlorine. It is well known that pulverised bismuth takes fire when projected into a jar of chlorine gas, and is immediately transformed into sesquichloride of bismuth, $Bi_2 Cl_3$. M. Heintz formerly remarked, that this chloride takes, in certain circumstances, a brown colour, and attributed this phenomenon to the presence of some other metal. M. Schneider, who was not contented with this explanation, sought for another, and found it in protochloride of bismuth, $Bi_2 Cl_2$—a substance which is formed when chlorine gas is allowed to pass gently over pulverised bismuth. In this experiment the metal does not take fire, but is covered, in a short time, with a brown, oily liquid, which an excess of chlorine transforms into sesquichloride of bismuth.

The process by which M. Weber prepares this protochloride is as follows:—Sesquichloride of bismuth ($Bi_2 Cl_3$) is heated, together with metallic bismuth, in a closed tube, and at a temperature which is sufficient to melt the metal; the whole is left to cool quietly in a sand bath. In this operation the sesquichloride takes a brown colour, and becomes opaque. When the whole is solidified by cooling, the excess of metallic bismuth is easily separated; and, if the temperature has diminished gradually, the protochloride thus produced often presents itself in crystalline needles, which are very fusible. Water decomposes it; likewise a high temperature transforms it into sesquichloride and metallic bismuth.

In the foregoing experiment, zinc, tin, mercury, and even silver, may be substituted for the metallic bismuth employed to reduce the sesquichloride. M. Weber has prepared, also, a bromide of bismuth, $Bi_2 Br_3$, by heating bismuth in vapour of bromine. The reaction takes place with evolution of heat and light, and production of a yellow mass o sesquibromide. This combination, like the corresponding chloride, dissolves metallic bismuth, and becomes brown, so that it is probable that a protobromide is produced.

In his paper, M. Weber remarks, that bromine has a comparatively slight action upon bismuth; but Professor Nicklès, of Nancy, has observed a glass vessel to be shattered with a loud report when pulverised bismuth was projected into liquid bromine. This accident may be prevented if the apparatus be kept very cool.

I must again refer to solar spots, and the phenomenon of the aurora borealis, or magnetic storms. Firstly: in my preceding letter, an error of the pen has made me attribute to Christopher Scheiner a work written by Galileo. The *Epistola ad Velsarum de Maculis Solaribus* are by Galileo; the first of these letters bears the date of 4th of May, 1612. It appears that Scheiner (who has been accused of striving to revenge himself on Galileo, by getting it whispered to Pope Urban VIII. that he [the Pope], in the *Dialoghi delle Scienze Nuove*, was represented as a foolish and ignorant Simplicio!) likewise published a work, *De Maculis in Sole*, in the same year, 1612. The history of the discovery of the solar spots is rather an intricate question, as we may judge from the following paragraph by Humboldt:—"The spots upon the sun," says this great and impartial historian of science, "were first observed through telescopes by Johann Fabricius, of East Friesland, and by Galileo (at Padua, or Venice, as is asserted). In the publication of the discovery, in June, 1611, Fabricius incontestably preceded Galileo by one year, since his first letter to the Burgomaster Marcus Welser is dated 4th of May, 1612. The earliest observations of Fabricius were made, according to Arago's careful researches, in March, 1611, and, according to Sir David Brewster, towards the close of the year 1610; while Christopher Scheiner did not carry his own observations back to an earlier period than April, 1611, and it is probable that he did not seriously occupy himself with the solar spots until the October of the same year. Concerning Galileo, we possess only very obscure and discrepant data on this subject.

It is probable that he recognised the solar spots in April, 1611, for he showed them publicly at Rome, in Cardinal Bandini's garden, in the Quirinal, in the months of April and May of that year. Hariot, to whom Baron Zach ascribes the discovery of the sun's spots (16th January, 1610), certainly saw three of them on the 8th December, 1610, and noted them down in a register, but he was ignorant that they were solar spots . . . "*

Both Fabricius and Galileo knew that these spots belonged to the sun itself. To Scheiner is attributed the discovery of the sun's rotation, deduced from the observation of them.

We must not regard the dark nucleus of the sun as a perfectly obscure body, since Herschel's ingenious experiments have shown us that if the light of the sun be represented by 1,000, that of the penumbra of a solar spot would be 469, and that of the spot itself 7. "Since the strongest light ever produced by man"—says Alexander von Humboldt (referring to Herschel's observations)—"Drummond's incandescent lime-ball, appears inky black when thrown upon the sun's disk, we cannot wonder that Galileo should have regarded the light of the nucleus of the sun's spots as more intense than that of the full moon . . . " If this incandescent ball of lime, "the strongest light ever produced by man," appears "inky black" when placed between the eye and the sun's disk, we must naturally conclude that the spots of the sun are *at least* as luminous as the most intense light ever produced by artificial means; which is equal to asserting that the "dark" body of the sun, seen through its brilliant photosphere, is an exceedingly luminous body.

Since the large solar spot observed by M. Secchi, and of which I spoke in my last letter, we have had more than one *aurora borealis*. Beginning with the pheuomenon of the 29th of August last, we have had up to the present date (17th October, 1859), a series of magnetic storms, some of which have been very intense. There was au *aurora* observed over a great part of Europe on the 11th October; and to-night, whilst I am writing these lines, an *aurora* is gleaming in the northern heavens, which is so visible here in Paris, that I doubt not we shall receive to-morrow morning a telegraphic dispatch from M. Secchi, at Rome, saying he has likewise observed it.

If I mistake not, the latter portion of the year 1859 will be long remembered in the annals of science for the number and intensity of magnetic perturbations accompanied by the frequent production of northern lights. And that these magnetic storms are in intimate connection with the spots on the sun seems beyond a doubt. "Nothing that occurs in our planet," says the author of *Cosmos*, "can be supposed to be independent of cosmical influences. The word planet instinctively leads us to the idea of dependence upon a central body . . . " At a very early period the sun's position was known to exercise a peculiar action upon the earth's magnetism—a fact which was completely confirmed by the discovery of the horary variation of the magnetic needle. General Sabine wrote in 1852, "It is a remarkable fact that the magnetic force is greater in both the northern and southern hemispheres in the months of December, January, and February, when the sun is nearest to the earth, than in those of May, June, and July, when he is most distant from it." He has likewise shown that these magnetic effects of the sun cannot possibly be attributed to any changes of temperature occasioned by the sun on the earth's surface—an opinion formerly held by many distinguished physicists. A celebrated French *savant*, Coulomb, in his *Memoires de Mathématique et de Physique*, (1780), believes the sun to be enveloped by a magnetic atmosphere. Finally, I have mentioned in a former communication to the "PHOTOGRAPHIC NEWS," the remarkable coincidence which arises from a comparison of magnetic data obtained at Christiana, Brussels, London, and Paris, with the results of M. Wolff's observation of the sun's spots. Between a maximum and minimum of magnetic variation there elapses a period of $11\frac{1}{9}$ days, which is likewise the period which elapses, according to M. Wolff, between a maximum and minimum of solar spots.

* See *Cosmos*, vol. ii., "Discoveries in the Celestial Spaces."

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

At the commencement of our journey, nothing surprised me more than to see the manner in which the roads were crowded with people. It was not merely at startiug that I was struck with this, though even then I could not but contrast the number of people moving about with the comparatively deserted environs of continental cities. Men and women, old and young, and boys and girls, down to the little things that could just run alone—all seemed to be out of doors, as if their business lay in moving from one place to another. I could not learn that they had any business, at least the majority of them, to set them travelling in this way, and I really think that it is caused by the innate restlessness of their dispositions. I could not help thinking what excellent dividends a railway would pay among such a population, provided they had more money to spend. These wayfarers were of all classes, from the landed proprietor to the beggar; the former, many of them, travelling with far greater ostentation than many an Eastern prince. Crowds of men go before and behind in a regular procession, which is arranged with the same care and ceremony as if it were a theatrical performance. The antics of these fellows are most ludicrous, and their appearance seen from behind, when the roads happen to be muddy, is, to say the least of it, singular, owing to the manner in which they tuck up the sole garment they wear much higher than the exigency of the circumstance would appear to require. Until I saw a procession of this kiud, I had no idea that the figures one sees on fans and other Japanese articles in Europe, could be drawn from the life. I looked upon the representation of the fat native of Japan, who always seems in the act of ascending an invisible staircase in seven league boots, as the production of the artist's imagiuation; but I was in error: it is, in truth, an attitude in which I have seen scores of individuals at the same time. On the very first day of our travels, we met one of these interminable processions in a rather large village. Dsetjuma dismounted, and of course I did likewise, and we stood beside our horse's heads in a respectful attitude until the great man had passed by. There were saddle horses, each led by two grooms, and behind each horse walked two men, one of whom carried a pike with a lacquered mantle, and the other had a bow slung over one shoulder and a quiver over the other. Then there were others who were armed with scimitars, others with old-fashioned muskets, others carrying lacquered poles with bunches of feathers fasteued at the top; and at intervals appeared an individual with a pole on his shoulder, from each end of which was slung a square box glittering with varnish, and covered with grotesque figures. Immediately in frout of the palanquin, in which the great man was seated, walked several couples of youths in rich dresses; indeed, many of the individuals who marched along ou foot had very rich-looking dresses; then came the palanquin, in which was seated the person to support whose dignity all this ceremony was made. He was a quiet-looking old man, with a grave and reverend face, very pleasant to look upon. He appeared absorbed in thought, and did not notice us. The palanquin was carried by six men, three before and three behind, but not on their shoulders,—the poles rested on their hands, which were about level with their shoulders. All these bearers were of the same height, and this method of carrying the litter is much pleasanter for the person carried than leaving the poles to rest on the bearers' shoulders. Following the palanquin were two horses with their trappings—I presume for the great man to ride,

* Continued from vol. iii., p. 70.

when he felt disposed: and after these came a like number and kind of men to those who headed the procession. I have seen too many strange customs to think any custom ridiculous because it is new to me, but certainly I could hardly prevent myself from laughing outright when I saw the litter-bearers marching gravely along with an affectation of carefulness which would have been natural enough if they had been descending a precipice, but which, under the circumstances, was most ludicrous. As to the fellows who carried the boxes, their mode of progression was precisely that represented on the lacquered articles which they manufacture here for exportation as well as for home use, to which I have already referred. Each seemed to try to raise his leg higher than his fellow, and I cannot help fancying that it originated in an attempt to imitate the gait of a horse, each porter having a laudable ambition to appear the most fiery animal, and, consequently, assuming very high action. But while imitating the action of a horse they appeared conscious of the rights of the rider, and every now and then would bring their heels in smart contact with the more fleshy part of their persons, and after their administration of this stimulant would immediately step out higher than ever, and fairly paw the air with eagerness, as if nothing but the restraint put upon them could prevent them from running away with themselves with the swiftness of the wind. This singular mode of going was not confined to the men who carried the chests; many of the others acted in a similar way, but not all of them. If the horses possessed half as much fire I don't think a Japanese would dare to get on their backs, for, as a rule, they are the most cowardly and ungainly riders I ever saw, and the horses seem made on purpose for them.

I estimate that the troop moved at the rate of about half a mile an hour; but they do not always move so slowly as this, as I found, when they were marching along the road, where there were none but wayfarers to see them, they walked in the ordinary manner. And here I cannot help saying a few words in praise of the roads. They are broad, smooth, and free from filth of any description, and even from anything which can be termed litter. The very leaves which fall from the trees by the roadside are collected, for the purpose, I imagine, of being thrown into the tubs containing manure, which stand in the fields, at a few paces from the road, ready for the reception of every particle of fertilising matter which may be found in their vicinity, and I have seen where, as occasionally happened, the tub was slightly screened from view, an announcement stuck upon a post informing the passer-by as to its whereabouts. It does not cost the government a farthing to keep the roads in this cleanly condition, for the value of everything in the shape of manure in Japan is such that the children from the nearest cottages are continually running up and down seeking what they can pick up.

These cottages, or, as it would be more correct to term them, huts, are little low wooden sheds, which must offer a very poor shelter to the inmates from the inclemency of winter, which is very severe, and especially against the bitter cold winds, which not unfrequently blow for days together. I looked into some of those we passed, and found they consisted for the most part of a single apartment, in which the whole family lived and slept, though how some of the families I saw managed to stow themselves away was to me a mystery. It is fortunate for them in this respect that the air can circulate through so easily, or they would suffer greatly from the vitiated atmosphere they would have to breathe. Even the inns in which we sometimes stayed were anything but models of comfort. Dsetjuma and I certainly got a room to ourselves, but without any furniture whatever in it beyond a carpet, on which we squatted ourselves, chatting and smoking until we felt disposed to sleep, when we merely stretched ourselves out and dragged a rug over our bodies, and we were in bed. This class of inns, however, are not the rule, and we chiefly met with them when we left the main road, for the purpose of making photographic excursions to out-of-the-way spots. Along the main road itself, the houses of accommodation are both numerous and good, and many of them of very large size. That, for example, in which we spent the first night of our pilgrimage, would have accommodated — and, in fact, did accommodate — more than a hundred persons. It would not have been large enough to lodge the same number in Europe, but the Japanese have peculiar notions of what is necessary, to which we are not accustomed. We were shown into an apartment at the back of the inn, overlooking the garden, having a spacious balcony, in which we could sit and drink tea and smoke undisturbedly, to our heart's content. The sweet smell from the beautiful flowers in the garden filled the air with perfume, which became stronger as the sun went down. Scattered about the garden were groups of travellers, and others, who were all engaged in smoking, eating sweetmeats, or playing a game which resembles chess. Everybody seemed happy; and it was pleasant to the eye to see among some of the groups women whose quiet, graceful behaviour made them very attractive, and so much the more dangerous for the inflammable hearts of the Japanese. We soon got tired of looking down upon this pleasant scene from our elevated position, as if we were philosophers who had reasoned ourselves into a thorough conviction that all these things were vanity, and beneath the notice of thinking individuals, so we mutually agreed that it would be a change for the better to mix among them, and inspect them more closely. We found that none of the men were of the lower classes, but comprised a sprinkling of every other. These were merchants, officials, officers, commercial travellers, and shopkeepers. Their behaviour towards each other was polite and agreeable, very much what it is in any country where people are accustomed to sit together in large numbers out of doors. Their drink was mostly tea, but a good many of them had a sort of beer, which I did not like much, but which was not unlike, in taste, the inferior kinds of beer they sell you in Holland. Others had various coloured syrups, which they mixed with water, and which make a far more palatable beverage than either the beer or the tea. As regards the latter article, I must say that I have drunk far better tea in Europe than here where it is grown; the reason, I believe, is, that they stew the leaves and dip the liquor out as it is required; however, the people seem to like it, and that is the essential for landlords.

Noticing that there seemed to be a larger assemblage of people at one corner of the garden, I went towards it to see the cause, and found that some wandering players were going through a performance in a summer-house. There was a man, seated on a raised seat, dressed in Chinese costume, with a bamboo umbrella over his head, looking gravely at three women and a boy, who were supposed to be going through the representation of a very tragical event in Chinese annals. The piece was nearly over when I joined the spectators, but I learned from Dsetjuma that two of the women had stolen the boy from the third woman, who had at last found them out and had them summoned before a Chinese magistrate, who, apparently, could only form a just appreciation of the merits of the case through the medium of their saltatory qualifications. At all events, the two women went through a considerable amount of exercise of this kind, and were followed by the third woman, who performed a *pas seul*, which had the effect of convincing the judge that she was the rightful owner of the boy, whom he ordered to be given up to her; after which exercise of his judicial functions he rose and left the court. But the performance did not end here. The mother expresses her joy in a dance accompanied with gestures and pantomime, which called down uproarious applause from the spectators, and, when she had finished, turned to the two female culprits over whom she had triumphed to demand her son. One of them, by way of reply, withdraws a covering from a heap lying on the floor, and shows the horrified mother her son. I expected to see her throw herself on his body,

and the exhibition to terminate amidst a general shedding of tears; but it was not so. The two women went through their triumphal dance in their turn, and concluded amidst the most enthusiastic applause. The plot was simply a peg on which to hang sundry dances, which were the real attraction to the Japanese. I saw nothing to admire in them myself; the dresses they wore were so long that the feet were concealed, and their movements were rather expressive than graceful. The spectators, however, seemed of a different opinion, and gave liberally to the performers when they came round to make a collection. All three of the women were young, and two of them had considerable pretensions to what is considered beauty here, and an air of modesty which surprised me after what I had just seen.

We next walked round the inn, and I was astonished at the number of rooms it contained. Its appearance as regarded from the street was rather contemptible, for its width was very small comparatively; but it was in its great depth that the secret of its capacity was contained. A wall appeared to run from one end to the other through its centre, and this wall formed the end of each room, the sides of which were made of mats or sliding shutters, which could be thrust back at the option of the persons occupying the different rooms, so that we were able to see from one end of the building to the other through all the rooms, all of which opened on the balcony of which I have spoken. In winter all these apartments are closed and are warmed in a way which is exceedingly unwholesome, and inasmuch as I dare say your readers have never heard of such a contrivance, I will describe it in a few words. In the middle of the room there is a square hole in the floor, about four or five feet deep; this is lined with clay, and in it hot ashes are placed, a grating being placed over the opening, to keep anything from falling in, I presume. I thought, when I was first told of this method of heating rooms, that I would rather suffer any amount of cold than sit in one so heated, but since then I have been so intensely cold, after riding several hours, that I have enveloped myself from head to foot in a rug, only leaving my face uncovered, and have sat on the grating itself.

(*To be continued.*)

Miscellaneous.

Iodo-Cyanide of Potassium. By J. Milton Sanders, LL.D. (Read before the American Photographic Society.)—If a saturated solution of cyanide of potassium in water is made, and immediately there is added to it a quantity of iodine in crystals, the latter quickly *dissolves*, forming a colourless solution, being that of the iodo-cyanide of potassium. I obtained this salt while experimenting upon substances with the view of getting rid, instantly, of the stains of nitrate of silver upon the hands and clothes. This salt fulfils that desideratum exactly. If a small portion of its saturated solution be dropped on the silver stain, whether on the hands or the clothes, it is instantly discharged, even after it has remained there several days. This peculiar property of dissolving silver stains will recommend it to the attention of photographers. Under polarised light, the crystals of this double salt present a most gorgeous appearance. Put on a glass slide one drop of the solution, and allow it to crystallise spontaneously. If, while the combination is ensuing, the slide be placed under the microscope with the polarising apparatus adjusted, the crystallisation and the ensuing phenomenon can be readily observed. As the fluid becomes sufficiently dense to yield crystals, they begin to start out on all sides, exhibiting a multitude of crosslets and daggers, which soon assume a pennate appearance, until, finally, they shoot out into beautiful reticulations of prismatic form, each long crystal presenting all the vivid hues of the spectrum. These hues, from their extreme vividness and delicacy, cannot be compared with the almost formless aggregations of the cyanide of potassium, should there be any of that salt in the solution. All the colours of the spectrum are displayed in these iodo-cyanide crystals, but presenting such combinations of hues, so contrasting, yet each one so metallic and brilliant, that the eye never tires observing them. These colours are most conspicuous when the selenite is made use of. The two thicknesses which I found to yield the finest colours, were the 3-4 and 1-4 sizes of Ross. With these selenites the crystals exhibited a set of hues which, for gorgeousness of colours, and their peculiar arrangement of contrast, I have never seen surpassed by any crystallisation I have ever examined. As the solution of this double salt decomposes in a few hours after being made, it will be necessary that the crystals should be formed immediately after mixing the ingredients. In order that there should be no superabundance of either ingredient, it would be necessary that each should be added in the proportion of its equivalent number. I would mention that the partial decomposition of the solution, by which some free iodine is eliminated, does not deteriorate this solution in regard to its wonderful properties of dissolving nitrate of silver stains from the hands and clothes; in fact, I think that the slight decomposition rather improves that property. As a wash for the stained hands and clothes, this salt must necessarily come into general use; and as a polaroscope object, the microscopist will not fail to have these double crystals among his cabinet of objects. I wish that some chemist who has more time on his hands than I, would investigate these double iodine salts. That this one referred to in this paper is the double cyanide of iodine and potassium (K Cy. K I) I have no doubt. It cannot be, as some friend has suggested, that this salt is a mixture of the cyanide and iodide of potassium. This is proved from the absence of a dual crystallisation, and the presence of an isolated one, together with the peculiar specific action it exerts upon polarised light; besides, if there should be a superabundance of the cyanide of potassium present, the peculiar crystallisation of that salt is plainly conspicuous, while the delicate and gorgeous ones of the iodo-cyanide can be easily distinguished from them. In regard to the peculiar brilliant action that these iodo-cyanide crystals exert upon light, I would remark that the double salts in which iodine acts as a component, appear to be peculiarly gifted in that way. Herapath's iodo-sulphate of quinine presents another instance of this specific action, and I have no doubt but that all other similarly constituted salts of iodine will exert upon polarised light the same peculiar action. Here is an avenue opened for the microscopists, and I hope that they may enter into this charming field of investigation with spirit, for it will yield a fine result. If too small a quantity of the iodine is added to the cyanide solution, it will combine and crystallise out, while the cyanide of potassium will afterward solidify and deteriorate the crystals. If, however, the proper quantity of iodine is added, this will not occur.

Photographic Notes and Queries.

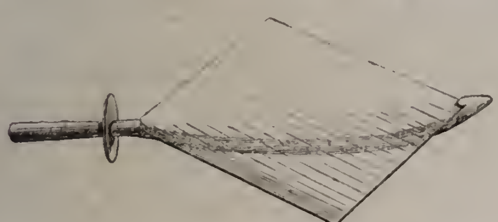
NOTES ON DRY PROCESSES.—NEW ACTION OF LIGHT.—HANDLE FOR GLASS PLATES.

Sir,—In the spring, you asked me to give my experience with the dry processes for publication, after I had sent you a few stereograms by Fothergill's process, but as they were similar to those published almost weekly in your admirable paper (which I count an hour's certain pleasure each week), I never did so. Since then I have scarcely done anything worth having with the dry processes; at least, since the summer heat commenced. Fothergill I gave up for the marbling complained of, and the collodio-albumen would not work at all—the plates turning quite brown from the heat, before they can be used, and useless on development. Fothergill stands heat better, I think, than collodio-albumen. This caused me much disappointment in two excursions into the woods, where I saw fine subjects, and took many, only to find black, dirty glasses on retiring. Now, I have taken a great many negatives with these processes, and Norris' plates too, and am quite satisfied that it was the great heat, often much above 100° in the sun, and as high, once or twice, as 98° in the shade, the same manipulation succeeding in cool weather; indeed, I found a Fothergill plate quite good about ten weeks old. The plates spoil much sooner in the cells of portable cameras, of which I have a very good one, which has six cells holding twelve plates, than in

a tin box. After the second excursion, which was up to the "High Falls," on the Rivière aux Lievres, a branch of the Ottawa, and to some large lumbering establishments, I schemed a developing box, which answers famously; so much so, that I feel certain, as far as it is concerned, of getting a good negative, and you may fancy the pleasure I have now. I came home the other day, after a visit to a place near St. Hilaire, C.E., with 24 stereographic negatives, and 15 turpentine wax paper ditto, 10 × 8. The box is some 20lbs., with everything in it—glasses, water bottles, bath, &c., many of which I carry, or have carried, in a fishing basket, if I wish to walk far. I very much doubt if I ever take a dry plate again, unless in winter. The turpentine wax process is very good. I think it is a decided improvement on the common wax paper. I shall send you specimens when I have time to print them.

In connection with M. Nièpce's experiments, about two years ago a circumstance occurred to me, which astonished me at the time (I was then a beginner), and not being a chemist, &c., such as he, I thought little more of it. Some positive paper had been prepared by leaving it a long time on the bath, till it was quite damp on the back, and having printed a negative by mistake, in the full blaze of the sun, the next impression bore the positive on the face, and a dull positive impression of the *last negative*, just before removed, *on the back;* the pressure-frame was covered in the usual way with black cloth, which must have got *heated* through the last negative and positive paper; there was thick plate glass in front, and it was a glass negative.

While you are on gutta percha in the "Mechanic," I may mention a handle for holding plates during development,



which I have never seen mentioned nor in use. I made my first some two years ago, and am never troubled with black fingers, at least, on the left hand. It is made of gutta percha rod, or whatever it is called, stout enough to have a spring when cold, so as to hold the plate diagonally into sunk corners; there is also a piece to keep the water from running on the hand. I inclose a sketch of it. I am sure it would be a good thing for lady amateurs.

The handle might be made lighter by putting a wire through it, to give the spring. I should say my developing box has a bag, fastening round the waist, and a ventilator. A professional friend has just got one made of strong tinned plate, which answers admirably.

Montreal, Canada East. ALEX. HENDERSON.

OXIDE OF SILVER FOR CORRECTING THE SILVER BATH.

SIR,—The value of oxide of silver as a corrective for the nitrate bath appears to be very much overlooked, probably owing to its being a chemical not usually on the shelves of the practical photographer, and partly, perhaps, from so many photographers being ignorant of the little amount of chemical knowledge requisite for its preparation. Be that as it may, I would recommend a trial of it to any of your numerous readers who may have a refractory bath.

The circumstances which called my attention to it, and the method of using it, are as follow:—We had been endeavouring to use some iron tablets which we had had by us for some time, but being unable to get a good picture on them we examined them more closely, and found the edges of the enamel had risen from the plate, which was acted on by the bath solution; we therefore cast them aside, but found immediately after that they had rendered our bath quite useless. After trying the usual remedies without success, we exposed the bath to full sunshine, till it was quite blackened, and filtered it; but as it came through the filter discoloured, we took about half an ounce of a 60 grain solution of nitrate of silver, in a measure, and added liquor potassæ (or solution of caustic potass) to it till it ceased to give a precipitate; we then poured it on a *small* filter, and, after washing it with two or three waters, added it to the bath (filter and all), and shook them well together. On again filtering the bath with a clean filter, it came through quite colourless. A day or two after we added a few drops of acetic acid, and found it to be in excellent working order, and it has continued so ever since—now near a month. I may add that I have used the same bath for nearly three years, and this was the first time it was so much out of order as to require putting aside for an hour. Still, I would recommend a second bath to be always kept in working order, to serve in an emergency like this.

In conclusion, I should feel obliged if some of your correspondents would say if they have found the iron tablets to deteriorate by keeping, as has been the case with us and with a friend who sent us a sample of them for our opinion on the subject. If they would keep (stored in a plate box), they would be very useful where a *portable* likeness was wanted in less time than is requisite for a transfer to be made; but until we have further information on the subject, we shall scarcely be tempted to use them again.

J. WALTER.

THE LINSEED DRY PROCESS.

SIR,—In No. 54 of the "PHOTOGRAPHIC NEWS" I find that your correspondent, "G. A. M.," has given the linseed process a trial, but complains of pinholes and doubling of the film. I have never experienced these drawbacks but once, and it then happened that I used a thin powdery collodion; but with a good collodion I find that the linseed exerts quite a contrary effect, rendering it tough and adhesive. I think, therefore, that if he would rough the edges of his plates in the manner described in vol. ii., page 58, and use the linseed mucilage more fluid, he will not again be troubled with the faults he mentions.

I inclose you a view of the beautiful but sadly mutilated doorway of the church of Nantua, taken on Monday, Sept. 26th. The plate was prepared June the 12th, the exposure 65 seconds sunshine. It is very badly printed, for, owing to indisposition, I left it to a raw hand to do for me; still, you will be able to judge from it as to the capabilities of the linseed process, with a plate prepared for that length of time.

W. W. HUGHES.

Nantua, Ain, France.

NOTES ON WORKING IN GUTTA PERCHA.

SIR,—I think wrapping two or three layers of gutta percha *thread* round an iron or brass wire dipper would be better and easier than the thin film you advise; the wire to be warmed when putting on the first layer, which is then to be passed over the flame of a spirit lamp and well closed with the fingers; then the second layer to be applied, warmed, and similarly closed, and then the third; the thread must be applied carefully and closely, as when splicing a broken fishing rod.

I have found the best way to close the joints of a gutta percha dish or bath was to pass a thickish table-knife heated in a spirit lamp, to avoid smoke between the two edges, which are thus simultaneously rendered plastic, and adhere well together by pressure.

When speaking of gutta percha, I may mention that I have had two large baths of that material in use for months, and never found the slightest injury from it; so that many of the complaints I hear of it are, I fancy, ill-founded.

M. M. D.

THE FOTHERGILL PROCESS.

Sir,—When I read the communication of "M. N. P. S.," in last number of the "News," I could not help smiling at the decided and almost dictatorial manner in which he condemns the "four drachm" system of washing Fothergill plates, coming to his sweeping conclusions because the greater number of plates which he had "partially" prepared in that way, and recently exposed, were failures.

Now, sir, with all respect to this magnate, I beg to say that I have prepared dozens of stereo. plates on the "four drachm" plan, and in, at least, seven cases out of ten, I have had most excellent results, meeting with neither stains nor "insensitive patches."

The fact is, in my humble opinion, this gentleman (who, I have no doubt, is a most excellent photographer) has been, for once, too hurried in the preparation of his plates on the occasion referred to, hence the stains, &c., and he has mistaken *over-exposure* for *decomposition;* and if he had sent you one of his "*red*" negatives along with his "choice specimens," you would, I have no doubt, come to the same conclusion.

He says he exposed his plates last June; now, if any of my brother photographers, who happen to keep a register of their work, will refer to their remarks made during that month, they will find that the light was *peculiarly intense* and *powerfully actinic*, and that, in consequence, of course, much less exposure was required.

"M. N. P. S." describes his lens focal length, half inch stop, &c. Now, I contend, that with such an "objective" in the month of *June*, 4½ to 5 minutes was ample exposure for landscapes under ordinary circumstances, and that if he gave his plates 7 to 8 minutes it is no wonder he met with "*red*" negatives and bitter disappointment.

Being unquestionably well up in the art, I doubt not he keeps a memorandum of the exposure given to each picture. Let him, then, tell us what time he gave to his "red negatives," and then it will be seen whether his "errors of judgment" or the much-employed "four drachm" plan is at fault.

FOUR DRACHMS.

ECONOMY OF WATER IN OUT-DOOR PHOTOGRAPHY.

Sir,—The following hint is at your service, if you think it worth notice.

In working wet collodion out of doors it is quite easy to dispense with the usual water for washing until you return home; a syrup made as follows will do:—

Treacle or golden syrup	1 ounce.
Water	3 ,,
Glacial acid	4 drachms.

About ½ an ounce of this poured on a plate, $6\frac{1}{2} \times 4\frac{3}{4}$, immediately after developing, will keep it clean for many hours.

No doubt any other moist substance would answer the same purpose, and *nitric* acid, in small quantities, would replace the acetic equally well.

Last week I compared two negatives taken in this way; one was exposed to direct sunlight after the syrup was poured off, and the other was inserted in the plate box, quickly without being exposed. On reaching my dark room I fixed them with cyanide, and washed; when compared, they are *equally clear* and free from fog.

J. ARCHER.

[Mr. Gulliver has described a similar plan in our first volume, p. 82. We have tried it, and find it very successful. —Ed.]

BLISTERS ON ALBUMENISED PAPER.

Sir,—A good deal has been said of late in the "News" about blisters in the dry processes. I have (only) lately met with the same thing in albumenised paper, used for positive prints; the highly glazed and *rolled* papers seem to show the evil most. I have used strong baths and weak ones without avail. Can any of your correspondents inform me of the cause?

J. H. H.

TO CORRESPONDENTS.

*** *Press of matter obliges us to omit the "Dictionary."*

X. X.—The promised information will be given in our next number. The sediment complained of as being formed when you were dissolving the gold is the *chloride of silver.* A small portion of silver is always present in fine gold, and this remains after the gold is dissolved, in the form of a flocculent white mass, which, of course, appears yellow when viewed through the solution of chloride of gold. In adding the acid solution of chloride of gold to the toning bath you have done wrong: it should have been neutralised first with carbonate of soda. If the "brown flakes" of which you speak are gold, it will be well to collect them in a filtering paper, which may be dried and burnt to tinder; which may then be treated with nitric and hydrochloric acids, when, if any gold be present, it will readily dissolve, and the solution will assume the characteristic yellow colour of chloride of gold. This solution, being separated from the ashes of the filtering paper, may be evaporated to dryness to expel the acid, as described in the present number. If, on the other hand, the brown matter be copper, the solution will be of a greenish blue, and, of course, may be thrown away. In this case, the gold will be in your toning bath, which may be tested before using. If it be acid, add more soda.

J. B. F.—Although it is usually stated that photographs are sure to fade if they are not properly washed, yet there are many reasons to induce us to think that long or short washing has not so much to do with their permanence as some persons imagine. We have taken pictures ourselves and washed them with the express object of ascertaining whether perfect washing was all that was necessary to the preservation of a photograph; and although these prints were washed as perfectly as possible, upwards of 20 changes of water having been employed, spread over a space of two or three days, and afterwards having five or six quarts of boiling distilled water poured over them, they faded unmistakably in less than a year. On the other hand, copies of Mr. Talbot's publication, "The Pencil of Nature," are at this day in existence, many of the prints in which (taken in 1844) are as fresh and perfect as they possibly can be, and these were merely rinsed in two or three changes of common water, on being removed from the fixing bath; the washing being conducted in such a manner that we *know* that hyposulphite of soda *must* have remained in the paper.

PROTOXIDE.—A collodion negative may be partially fixed in a bath of salt and water, and the fixing with hypo., and subsequent washing, deferred until the evening. A well-varnished mahogany box, with grooves of the same wood, is the best thing in which to stow away the partially fixed pictures: several thicknesses of blotting paper should be placed at the bottom for the plates to stand upon.

NEMO.—1. The statement is exactly as we gave it. We think, however, it is very probable that you will not find the gold go so far as there stated. 2. Throw the freckles slightly out of focus, so as to make them blend one with the other.

PEARL.—The coagulation of your albumen solution has been caused by your having attempted to iodise it with iodide of cadmium. Most salts of the heavy metals have the property of causing solutions, containing albumen, to curdle when brought in contact with them.

MANNERS.—The great difficulty in microphotography is to obtain a collodion which gives a film sufficiently fine and delicate to bear the high magnifying power. Chloroform, added to the collodion, is said to remedy this, but we have never succeeded with it ourselves.

R.—About 4 grains of iodide of ammonium to the ounce of collodion is the strength generally preferred for negative collodion. The same number of grains of the corresponding cadmium or potassium salt may be used, if you object to the ammoniacal base.

A. D. J.—Either benzol or chloroform will dissolve India-rubber, and, on evaporation, leave it in the form of a film on any surface to which it has been applied.

J. C.—The negative seems good, but the positive is not at all well printed. It has not remained in the fixing bath long enough, and is of a very feeble colour.

JUVENIS.—Prints taken from one of Mr. Talbot's photoglyphic plates are not usually classed under the head of *carbon* prints, although they are as deserving of this title as any other photographs.

E. B. F.—Nothing can be added to the collodion. You must work in a good light, and have a quick lens. We do not know how the article referred to is made. It is, however, very inferior in quality.

J. G. F.—The articles have arrived. We should like to have further communication on the subject. Will our correspondent inform us where a letter will find him?

SUNBEAM will find full information on the subject of cleaning dirty bottles in our second volume, p. 60.

J. H. E.—Some hypo. has touched the paper in an early stage of its preparation, and thus caused the spots.

UNFORTUNATE PHOTO.—The fixing solution is not strong enough. Increase the strength, and keep the prints in longer.

C. M.—1. The albumenised paper is very bad, being covered with small metallic spots. 2. The aplanatic.

G. H.—Yes, by bringing the camera sufficiently close to the picture. Either the collodio-albumen or Fothergill process.

IGNORAMUS.—Such a thing is easy to do. See Mr. Sang's paper on the subject of the "Copying Camera," in our second volume.

B. JONES.—The pictures are very good. In our next list.

W. K.—Apply to the secretary, who will give you all the requisite information.

J. BLACK.—We have received the article, and read it with great interest.

G. S.—The collodion is not good. Try another sample.

SILVERPEN.—We have recently used the preservative case with success.

Communications declined with thanks.—F. L. E.—Pyro.—Johnny Q.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—Pontypool.—A. C. E.—Euston R.—X. Y. Z.—Focus.

IN TYPE:—D. C. P.—M. Van Monkhoven.—B. M. Brackenridge.—M. A. Root.—J. N.—G. H. W.—R. J. Fowler.—Nemo.—C. Craig.—N. Ennel.—An Amateur.—I. B.—J. G. F.—H. M.—C. B. G.—LL.B. Cantab.

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 60.—October 28, 1859.

THE CONDITIONS AFFECTING THE ALTERATION OF CHLORIDE OF SILVER BY LIGHT.

BY JOHN SPILLER, F.C.S.—OF THE WAR DEPARTMENT, WOOLWICH.

The following observations embody the results of a series of experiments made with the view of assisting in the determination of the precise nature of the change, and the conditions affecting the decomposition of chloride of silver by exposure to sunlight. The present communication bears reference solely to the latter part of this proposition, and is devoted to the consideration of a variety of circumstances which have been found to exercise an influenee either in promoting or retarding the decomposing agency of the sun's rays, or to affeet the colour of the ultimate product.

As a convenient mode of submitting the chloride of silver to the action of the light, some sheets of unsized paper were impregnated, first with a thirty-grain solution of nitrate of silver, dried, and subsequently immersed in chloride of sodium solution of twice the degree of concentration; thoroughly washed in distilled water, to remove the soluble soda-salts, again dried, and the chloride of silver paper so prepared, preserved in the dark. Then, in order to study the influence of various chemical reagents in assisting or impeding the darkening action, strips of this paper, arranged in series, were moistened with the several solutions under trial, and exposed to the sun's rays in an ordinary pressure frame, the results being noted at progressive intervals of time, and compared with the indications afforded by the pure chloride of silver paper. According to this system of experimenting, several interesting faets were observed, of which the following is a summary:—

Influence of water.—The chloride of silver paper exposed under the three conditions of moist, dry, and the ordinary hygroscopic state, showed evidence of accelerated action due to the presence of water; the distinction between the second and third sheets being, however, almost inappreciable.

Influence of nitrate of silver.—A series of four papers moistened with nitrate of silver solutions of increasing strength (1, 5, 15, and 30 grains respectively to the ounce of water), were exposed in comparison with the damp chloride paper. The rapidity of darkening was clearly shown to follow the order of concentration; while the highly dilute solution of nitrate gave but very trifling advantage over pure water.

Influence of oxidising agents.—Diluted nitric acid and chlorine water were found to exert from the first moment a retarding influence on the progress of the blackening; and, although the final product was much the same in colour, the presence of these oxidising bodies was evidently antagonistic to the decomposition of the chloride.

Influence of reducing agents.—Under this class of substances were tried gallic, pyrogallic, oxalic, and tartaric acids; cane sugar, the protochloride and sulphate of iron, and the protochloride of tin. Of these the effect of sugar and the several organic acids was but slight; the iron-salts exhibited a well-marked aetion in promoting the change; while the protochloride of tin exerted a still more powerful effect in the same direction. A well-marked influence in hastening the decomposition was likewise observed when the papers were moistened with solutions of carbonate of soda, and other salts having an alkaline reaction, *e.g.*, fluoride of potassium, and the phosphate and tungstate of soda. Such action is probably attributable to the power possessed by these compounds of absorbing the chlorine at the moment of liberation from the silver salt, and they must be considered as exercising in this way the prerogative of reducing agents.

Influence of coloured media.—It was to be expected that the colour inherent in many of the metallic solutions employed in these trials, would have a physical influence in determining the character of the decompositions, irrespective of that exerted by their chemical properties; hence it became necessary to separate these distinct actions, and to refer them to their respective causes. With terchloride of gold solution, and the double chloride of sodium and gold, this was especially observable. The deep yellow colour of these fluids appeared for a moment to hinder the action of the sunlight, but the gold becoming quickly reduced contributed to the general darkening of the surface, and lent a greenish hue to the resulting product; on longer exposure the intensity was increased, until it ultimately acquired a warm black tone. Bichloride of platinum solution, not being itself reduced by light, appeared to act as an orange-coloured medium in altogether preventing the darkening of the chloride of silver. And the bichromate of potash, similar in colour, afforded for a time the same protection, until at length, becoming reduced by the organic matter of the paper, the decomposition of the chloride of silver was allowed to proceed. Under a strong solution of perchloride of iron the change of colour progressed but very slowly; while the blue sulphate of copper was apparently without influence. On the other hand, rose-coloured solution of nitrate of cobalt evinced at every stage a well-marked accelerating action, and afforded a darker ultimate tint than the chloride of silver alone.

It was remarked in the case of bichloride of platinum that a chemical influence appeared to be exerted, to which partly must be attributed the protective action observed in this instance. It would appear that this metal is absorbed into the composition of the insoluble chloride, for, on mixing solutions of bichloride of platinum and nitrate of silver, a yellow precipitate is produced, which, on exposure to light, is not appreciably altered in colour; also, it will be found that freshly-precipitated chloride of silver, by contact with the platinum solution, although subsequently well washed, has had its sensitiveness to light greatly impaired.

Influence of other metallic solutions.—Aqueous fluoride of silver (containing 2½ per cent.), exerted much the same effect as a solution of the nitrate of a superior degree of concentration; a browner shade of colour was apparent from the first. Acetate of lead also accelerated the alteration of colour, but at the same time communicated a less agreeable reddish tinge, which a special experiment has shown to be due to the absorption of lead into the composition of the darkened chloride. Chloride of mercury solution is known to preserve the silver compound in its original condition of whiteness.

Influence of certain decomposing agents.—Chloride of silver brought into contact with a solution of iodide of potassium becomes converted entirely into iodide of silver, and is not then visibly affected by light. The same general result, but in varying degrees, followed the application of bromide, sulphocyanide, and ferrocyanide of potassium. In the latter case the paper acquired a blue colour on long exposure, while the ferricyanide of potassium communicated a green tint under the same circumstances.

The foregoing experiments, made originally in June, 1856, have been in many instances repeatedly corroborated by subsequent trials, and some of the conclusions are well confirmed by the general practice of photography. Among the reactions detailed, those which appear to be susceptible of practical employment, and likely to reward a more lengthened investigation, will be included, perhaps, in the extended application of the protochloride of tin, which possesses reducing powers almost without parallel; and secondly, the employment, either alone or conjointly with the nitrate, of the fluoride of silver, a very soluble, even deliquescent, salt, which, under certain conditions, appears to impart a high degree of sensitiveness to the chloride and other compounds of this metal, and whose application to photography was, I believe, first suggested by Becquerel.

Chemical Department, Woolwich Arsenal, Oct. 26, 1859.

PYROXYLINE CONSIDERED IN ITS CHEMICAL ASPECT.*

BY M. VAN MONKHOVEN.

There are many substances of the same composition known in chemistry by the name of cellulose. Paper, flax, hemp, and cotton, are essentially formed of cellulose. Examined with the aid of a microscope, these bodies appear in the form of loose fibres, intersecting each other in every direction, and thus constituting a tissue, more or less compact. Of all the substances containing cellulose, cotton presents this product in its purest state, for, with the exception of some impurities which it contracts while passing through machinery, cotton is composed of pure cellulose. In speaking hereafter of cellulose, the reader may consider the unwoven white cotton as the type of this body.

Cellulose exhibits several very important properties. We propose to treat of only two of these properties, and, indeed, almost exclusively of but one. If into a solution of the ordinary sulphate of copper of commerce, some caustic potash be poured until complete decoloration occurs, a precipitate is formed of green hydrate of oxide of copper:—

$Cu\,O, SO_3 + KO, HO = KO, SO_3 + Cu\,O, HO.$

If the oxide of copper be washed in filtered rain water—if it be dried by casting it upon a canvas stretched in the air, and not in a stove (where it would become brown), and if, afterwards, it be dissolved in concentrated ammonia, there is finally obtained a liquid of an extremely intense blue called *oxide of cuprammonium.* This liquid possesses the property of completely dissolving cellulose. If, after having allowed the liquid to settle, it be poured into a large glass vessel filled with very dilute sulphuric acid, there will be precipitated white flakes of perfectly pure cellulose, having for their composition $C_{24}\,H_{20}\,O_{20}$.

The second peculiar property of cellulose, which in photography exhibits the greatest importance, is its transformation into gun-cotton, by means of nitric acid. Thus, if cotton be steeped for ten minutes in concentrated nitric acid, and afterwards washed in plenty of water and then dried, its appearance would lead one to infer that no change had taken place. If, however, it be weighed before and after this operation, it will be found that it has sensibly increased in weight. The cotton has then undergone a chemical transformation; it has assimilated the nitric acid while losing the water. The chemical equation may be described as follows:—

$$\underbrace{C_{24}H_{20}O_{20}}_{\text{Cotton.}} + \underbrace{5\,(NO_5.HO)}_{\text{Monohydrated nitric acid.}} = \underbrace{8\,HO}_{\text{Water.}} + \underbrace{C_{24}H_{17}O_{17}\,.5\,NO_5.}_{\text{Gun-cotton.}}$$

The product thus obtained has received the names of pyroxyline, xyloidine, gun-cotton, &c. &c.

Any variety of cellulose ordinarily at hand, may be employed in this operation; generally, cotton is used. The produce thus obtained is white, and so much resembles cotton as to be mistaken for it. It is insoluble in water, alcohol, and ether, but dissolves in acetate of ethyl, acetone, alcoholysed ether, methylic alcohol, &c. The best solvent is very pure acetate of ethyl. Our efforts to apply it to photography have, however, always proved ineffectual. The pellicle left by this solution on the surface of the glass is granular, and of an opaque white, whilst the layer left by the solution of pyroxyline in alcoholised ether exhibits complete adhesion and clearness. Pyroxyline burns with extreme violence, if approached by any burning substance. It possesses a much greater explosive power than the best gunpowder, and burns so swiftly that, if placed upon ordinary gunpowder and lighted, the powder remains perfectly intact. When heated to 140 degrees (cent.) only, that is to say, to a temperature but little above that of boiling water, this substance suddenly bursts into flame, and breaks, with violence, the vessel containing it. On this substance first becoming known, attempts were made to apply its use to fire-arms, but its high price caused its rejection, as much as its excessive explosibility. In fact, in using gun-cotton, it burns so suddenly that it destroys weapons of ordinary quality, and even deteriorates those of superior quality. In a word, it is of a bursting quality, but will sooner or later, doubtless, be employed in mining operations, in which it will prove of great service. Pyroxylines prepared with the aid of flax, hemp, or paper, do not possess so explosive a power as that obtained by means of cotton. The chemical composition, however, is the same with all these bodies.

The name *collodion* is given to the solution in alcoholised ether of one of the varieties of pyroxyline of which we have spoken above.

M. Le Grey, a French photographer, was the first to use collodion in photography. The following are a few lines from this author, published in a pamphlet in 1850:—"I have just discovered a process of photography upon glass by hydrofluoric ether and fluoride of potassium dissolved in alcohol at 40 degrees, mixed with sulphuric ether and saturated with collodion; I then sensitise with aceto-nitrate of silver, and so obtain proofs in the camera in five seconds in the shade; I develop the image with a very weak solution of sulphate of iron." The same year MM. Archer and Fry published in England the complete method of photography on collodion, as we now possess it, and were justly regarded as the inventors of this process. In fact, it was impossible to use the original formula of M. Le Grey: in the first place, because the fluorides do not form any images; in the second place, because hydrofluoric ether is a body not as yet in existence. As the English operators could receive no guide from the few words from M. Le Grey, they have a right to claim the priority of this invention.

* From the Bulletin of the French Photographic Society.

CHLORIDE OF GOLD—ITS PREPARATION FOR PHOTOGRAPHIC PURPOSES.

BY ALEXANDER WATT.

It is important that the chloride of gold to be used for photographic purposes should be perfectly neutral and chemically pure; and as it may be useful to photographers to become acquainted with a simple method of preparing it, I purpose now explaining the plan pursued by myself for nearly twenty years, and I feel sure that the most unskilful can scarcely fail to practise it with success.

The fine gold of the refiners is seldom contaminated with anything but silver, and this appears in an inappreciable quantity, and is perfectly harmless.

In preparing the chloride of gold, a porcelain capsule of sufficient depth should be used, to prevent waste, and into this place a certain quantity of fine grain gold, say, 1 pennyweight, or 24 grains. Now pour on about two parts of hydrochloric acid to one part of nitric acid, or, by measure, about two drachms of the former to one of the latter; allow these to act for some little time, when, if it is desired to hasten the operation, gentle heat may be added,

in which case the gold ought to disappear pretty rapidly; if, however, too much heat be applied, the acid will be evaporated before it has done its duty; and in such a case it will be necessary to add, in the same proportions, a little more of the mixed acids. The quantity is immaterial, provided there is sufficient to dissolve the gold. When the gold has disappeared, there will be observed a slight amount of flocculent matter at the bottom of the capsule, which is chloride of silver; this should not be heeded, as it will not in any way interfere with the operations in which chloride of gold is used in photography; but it may be readily separated, if desired, by pouring off the solution of chloride of gold from the sediment of silver.

The solution of chloride of gold is now to be subjected to a moderate heat to expel all the acids. When the quantity of solution is considerably reduced, which will take but a short time, the capsule should be moved about so as to disperse the chloride over as large a surface as possible, by doing which, not only will the operation be hastened, but the acid will escape more freely, the gold not being allowed to crystallise. After awhile, the solution will assume a blood-red colour, and it will become thick and flow slowly. When it arrives at this stage of the process, the capsule must be kept constantly in motion, and the heat discontinued the moment the last drop ceases to flow. The heat of the capsule will generally expel the little trace of acid remaining, but this will, of course, depend upon the heat which has been applied.

If the operation be carried on too far, the red colour of the gold changes to purple, from thence to yellow, and in another instant the gold becomes reduced to the state of gold bronze, where the heat employed was greatest. If this should be the case, a little more of the mixed acids must be added, which will instantly dissolve the gold bronze, and the operation must then be carried on with more care.

When the acid is thoroughly expelled from the chloride, it is in a perfectly neutral state, and requires only to be dissolved in distilled water for immediate use. It may be conveniently kept in the form of solution for photographic purposes, and in doing so, if it is dissolved in a definite quantity of water, say, one ounce to the chloride obtained from a pennyweight of gold, which is equal to about 37 grains of chloride; or the chloride made be dissolved in ether, from which it may be spontaneously crystallised and put in a bottle, from which air must be excluded. In keeping the chloride of gold in solution it will be necessary to protect the bottle from the light, by pasting yellow or brown paper all over it, or it may be kept in a yellow glass bottle sold for such purposes.

Critical Notices.

How to take Stereoscopic Pictures. By William Ackland. London: Horne and Thornthwaite.

"How to take stereoscopic pictures" is a problem which we trust most of the readers of the "Photographic News" have long since solved; those among them, however, who may have doubts on this subject can obtain the information necessary to enable them to overcome any difficulties in their way by purchasing a little book under the above title. We have had occasion to mention Mr. Ackland more than once in this journal in connection with Fothergill's process, so that his name will not be unfamiliar. His book, on which we are about to offer some remarks, is not an elaborate one, like that of Mr. Hardwich or Mr. Lake Price, but is simply a little book confined almost entirely to the subject which the title indicates. It commences with some remarks on binocular vision, with which we have no fault to find, except that it attributes the invention of the refracting stereoscope to Sir D. Brewster, whereas it was, in truth, invented by Professor Wheatstone. We do not greatly blame the author for having fallen into this error, as it is one which is shared by many who are in a position to be better informed.

The only process mentioned as possessing any novelty is one which the author terms "Powell's new dry process," which he states he has employed for some months with unusual success. The author has contented himself with stating that the collodion used is of a superior character, and possesses peculiar qualities, and is iodised with a solution made by the same person who invented the collodion, and possesses corresponding qualities. The reader must not suppose that it is necessary that he should be informed on these points in order to enable him to practise the process, as he will see on reading the book, which explains in the clearest manner how this can be accomplished. There is this difference between Powell's process and the better known dry processes—he does not employ albumen for preserving the sensibility of the plate, but substitutes for it a glycyrrhizine solution.

The kind of camera to be used, and all the various apparatus requisite to enable the novice to become a Fenton, or a Woodward, or a Bedford, are all duly set forth; and if he has not all the apparatus which he can possibly require under every conceivable circumstances, it will not be because Mr. Ackland has omitted to call his attention to it.

The method of producing glass positives as described by the author is simple enough; it is as follows:—"To produce glass positives, close the door of the operating room, place the negative, face upwards, in the pressure frame, and on it, face downwards, lay a sensitive plate, prepared by Powell's process; the backboard is then laid on the sensitive plate, and the crossbars fastened down, so as to bring the sensitive coating on the plate in direct contact with the negative; wrap up the pressure frame in the focussing cloth, open the door of the operating room, and all is ready for exposure. The direct rays of the sun are far too energetic for our purpose, therefore remove the focussing cloth, and expose the frame, face upwards, to the northern part of the sky, from two to five seconds, according to the intensity of the light; then again cover up with the focussing cloth, return to the operating room, close the door, and proceed to develop and fix the image. If the operator cannot conveniently make use of daylight for printing, place the pressure frame in front of, and six inches from, an argand lamp or gaslight, and allow it to remain undisturbed about two minutes; then proceed to the development."

Instructions for the Successful Practice of the Fothergill Dry Process. By Alfred Keene.

The numerous inquiries which have been made of Mr. A. Keene with respect to Fothergill's process has induced him to write a little book on the subject, which shall obviate the necessity for applying to him in future for information. To attain this object he has gone very fully into details, and gives some additional information on the subject of the manipulations beyond what has appeared in this journal on the subject. He has not confined himself entirely to describing Fothergill's process, but includes a brief description of the collodio-albumen process, as well as some others; but it is of the first that he has constituted himself the champion ever since its discovery, and it is this which gives to the pamphlet he has just issued its chief value.

Dictionary of Photography.

Funnel.—This having been fully described, under the head of *filtration*, in Nos. 57 and 58 of this journal, need not be further treated of in this place.

Gallic Acid.—An organic acid of a slightly yellowish tint; very light, and crystallising in fine needles. It is very slightly soluble in cold water—100 parts at the ordinary temperature only dissolving one part of the acid. At the boiling point, however, it is rather more soluble, three parts being taken up; it is very soluble in alcohol. Gallic acid is one of the most valuable photographic agents, as it has an energetic reducing action upon certain silver salts which have been exposed to light—nitrate of silver, for instance. On this account it is almost universally employed as a developing agent in the various negative processes on paper.

Gelatine.—A complex substance derived from the animal kingdom, and occurring in bones, skin, &c. It dissolves

in hot water, and if present in a larger proportion than one per cent., causes the solution to solidify, or, as it is generally termed, *gelatinise* on cooling. Isinglass is an example of gelatine in an almost pure state; the purified gelatine of the shops is nearly as pure, whilst glue and size are merely the same body in an inferior condition of purity. Gelatine softens and swells up in cold water, but does not dissolve, unless heat be applied; it is insoluble in alcohol. Gelatine is very similar to albumen in some of its properties, but differs from it in being incapable of coagulating by heat or contact with certain salts; on this account it cannot be used as a substitute for albumen in preparing highly glazed paper for positive printing, as it would dissolve off in the silver bath—in fact, some of the cheap albumenised paper (so called) is prepared with a common kind of gelatine. In combination with tannin it forms an insoluble substance, which is the basis of leather; and alternate washes of gelatine and tannin solution have been found, by Mr. Wentworth Scott, to make an excellent and durable glaze for paper prints. A detailed account of this method of forming "leather varnish" will be found in the "Photographic News," vol. ii. p. 172.

Glucose—known also as *grape* or *starch sugar*—is one of the numerous family of sugars. It is one of the chief constituents of old candied honey, and occurs in nature in ripe grapes and other fruit. It may also be prepared artificially by the reaction of sulphuric acid on starch.

Glycerine.—A syrupy liquid of an intensely sweet taste, colourless and inodorous, which is separated from most fatty and oily bodies during the process of saponification. It is mixable in all proportions with water and alcohol, and dissolves most of the bodies which water will dissolve, such as iodide of potassium, nitrate of silver, &c. Glycerine being almost without chemical action on salts of silver, and being non-volatile at ordinary temperatures, has been very successfully employed in preserving collodion plates in their moist and sensitive condition. Formerly glycerine could only be obtained at a high price, and in a very impure state; but lately an article has been introduced into commerce, under the name of distilled glycerine, which can be relied upon, as being very pure and uniform in its quality.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS.—GLASS NEGATIVES—(*continued*).

Although the process of taking negatives is much the same as that by which positives are obtained, still there are some important differences in the manipulation and in the materials employed, which I now proceed to explain.

The principal object, as I have before remarked, in taking a negative, is to continue the operations until the deposit of silver becomes sufficiently dense to resist the light in the after process of printing. This being borne in mind, the student may proceed as follows:—Pour a small quantity—say a quarter of an ounce—of the developing agent into the ounce glass measure, and put this where it will be conveniently at hand when the picture is taken; next focus the object to be taken, and prepare the plate, as described for positives. In pouring on the collodion, let this operation be done leisurely; do not hurry the collodion into bottle, but gently incline the glass, and allow the surplus collodion to enter the bottle gradually; when it has nearly ceased to flow, rock the plate gently to and fro, to prevent reticulation; and when the collodion has all run off, place the stopper in the bottle, and, allowing a few seconds to elapse, promptly immerse the plate in the bath; allow it to remain for about *half a minute*, and then lift it out of the bath two or three times. When the collodion is becoming thickish, from having been a good deal used, it may be advisable to dip the plate up and down in the bath three or four times to wash off the ether, otherwise the film may become streaky, and the resulting picture will be spoilt.

The plate may remain in the bath for *five minutes* altogether; it is then to be removed, and the aceto-nitrate of silver allowed to run off into the bath for a few seconds; the plate is then to be drained for a short time, by placing one corner upon a fold of blotting paper, and the back of the plate may be wiped with a damp rag. It is then ready for the plate-holder.

The exposure in the camera, if the full aperture of the lens is to be employed, may be from five to eight seconds, on a bright day, for in-door work; and it will be better rather to under-expose the first picture than otherwise, in order to ascertain if the plate is free from fogginess.

The developer should be poured all over the plate at once, in order to prevent any irregularity in the action of this agent; and if the plate has been under-exposed, the image will appear slowly—the high lights coming out first. After the developant has been on the plate for about half a minute or so, it may be returned to the measure, and the agent be again poured on as before. In fact, the same developer may be poured on and off several times, to allow the operator an opportunity of examining the picture, which will be first seen by looking *through it*. If there is any of the detail of the original wanting, the plate has been under-exposed; and no amount of development will bring out what the light has failed to depict.

After washing the plate for a few seconds, the cyanide fixing solution is to be poured on, when the shadows should become instantly quite clear and transparent, if the plate has been under-exposed; but if there is any evidence of fogging, it will be necessary to add two or three drops of glacial acetic acid to the exciting bath. The next plate should then be exposed for a longer time. If the first plate, when brought out to the light, after fixing, looks well as a positive, and all the detail of the original appears, although faint and weak, in the half-tones, the exposure required for the next plate will be at least double that given for the first, if the light appears about the same.

In developing the next plate, if it has been sufficiently exposed, the image will appear at once, that is, probably, about five seconds after the developing agent has been poured on. The operator must continue to pour the developer on and off, as before, looking at the image each time, to see if it be sufficiently dense and black; and if there is any difficulty in obtaining the required density, it will be better at once to wash and fix the picture. After fixing, the plate must be well washed again, and two or three drops of the exciting-bath be put into the measure (previously rinsed out), to which about a drachm or so of the developer is to be added. This mixture is then to be poured on the plate, when it will be found to "intensify" the image considerably. This operation may be carried on in the open daylight; and when the required density is obtained, the plate is to be again well washed, and placed aside to drain.

Sometimes, when the bath is new, it will be difficult to obtain sufficient intensity in the image, in which case it will be advisable to strengthen the developer, by adding thereto from half a grain to a grain, or even two grains, of pyrogallic acid to each ounce of developer, in dull, cold weather; and if this fails to give the result desired, it may be necessary to add a few drops of acetate of soda to the bath. This may be made by dissolving about five grains of carbonate of soda in half a drachm of water, to which acetic acid is to be added until effervescence ceases, when it may be at once dropped into the bath—four or five drops should be sufficient. It is not advisable, however, to add anything to the bath, if it can be avoided.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Another method of piercing holes in glass is by means of heat, in effecting which, however, the use of the blowpipe will be necessary. As some slight knowledge of the mode of using this instrument will frequently be found necessary, we will, before proceeding further, make a few remarks on the subject.

A great variety of blowpipes have been invented and recommended by high scientific authorities, and where an extended use of the instrument is intended, doubtless have each their respective advantages. For amateur purposes, however, the simplest form, described in a recent article, will generally be found the best and most easily managed as well as the cheapest

and most easily produced. It is a noteworthy fact, also, that, notwithstanding the various proposed improvements in the construction of the instruments, working goldsmiths, and other similarly employed artizans, prefer to adhere to the use of a blow-pipe made of brass, of the form we have described. Various metals have been recommended as most suitable for the purpose. Brass has the inconvenience of acquiring the taste and smell of verdigris, which is, however, to some extent, obviated by making the mouthpiece of ivory or silver, and having the part in contact with the hands well lacquered. Silver is good for the purpose, but costly, and the same remark applies in a stronger degree to platinum. Perhaps among metals nothing is cheaper and less objectionable than tinned iron. For the use of the amateur, however, we think glass possesses the most advantages, as being easy to produce, and pleasant and cleanly in use.

The flame for use with the blowpipe may be produced by a candle, a lamp, or gas. A candle has many disadvantages, as it is apt to melt and gutter, and frequently furnishes insufficient heat. If a lamp be used, many prefer the use of oil to alcohol. The wick holder should be oblong, not circular; the wick about one inch broad and one-eighth thick, and projecting about one-fourth of an inch above the holder. The flame is to be blown in the direction of the breadth of the wick. Where it is available gas is preferable for the purpose. It is desirable that the flame from the gas should be as little spread as possible, and the use of wire gauze, for the purpose of producing a solid flame, is recommended. A copper cylinder, with a wire-gauze top, attached to a common argand burner, answers the purpose exceedingly well. A simpler method, and one much used by artizans, is simply to unscrew the burner and allow the flame to proceed from the orifice of the gas pipe, regulating the pressure of course; by this means a suitable flame is obtained.

In using the blowpipe the consideration of first importance is to keep up a continued stream of air as long as the heat on one spot is required, and to do this without great fatigue to the lungs a proper method must be acquired. The chief art in the matter is to learn to breathe through the nostrils only during the operation; to do this, and, at the same time, blow from the lips will require a little practice. The mouthpiece of the blowpipe being placed in the lips, the mouth should be filled with air until the cheeks are distended, the air is then gently and steadily expelled through the tube. In order to breathe through the nostrils, and thus maintain the supply of air in the lungs without interrupting the flow of the stream through the pipe, a slight motion of the tongue, which is made to touch the roof of the mouth, and thus interrupt the communication with the nostrils is necessary. So long as the supply of air is kept in the lungs through the nostrils, the mouth will be supplied from the lungs. The movement of the tongue against the roof of the mouth is similar to that produced in pronouncing the syllable "tut." By a little practice this will become easy, and a continuous blast be kept up without difficulty. Where the blowpipe is much used the lips will become a little pained by long-continued compression, but this may be to a large extent prevented by flattening the end which forms the mouthpiece, which can be very easily accomplished in glass.

Facility in blowing having been acquired, the aperture of the blowpipe should be brought almost into contact with the flame, if of a lamp, just above the wick, if of gas, about an inch from the top of the flame, and the air steadily expelled through the tube. The flame, deflected by the blast, will assume the appearance of a cone, the interior of which is of a somewhat light blue, and converging to a point at about an inch from the pipe; the outer part of the cone of flame is yellowish and indefinite looking. The intensest heat is at the apex of the blue flame. If the flame be ragged and irregular it proceeds from irregular blowing, from the blast being directed improperly against the flame, from the aperture of the blowpipe being imperfect and jagged, instead of round and smooth, or from the aperture being too large. In any of these cases the remedy will be easily applied.

The facility for producing a steady, perfect deflection of the flame, and the mode of applying it, will depend on the purpose for which it is required, and will be described from time to time as required. The method of piercing holes in glass by its aid must be deferred until next week.

(To be continued.)

Photographic Chemistry.

THE METALLOIDS.—(*continued.*)

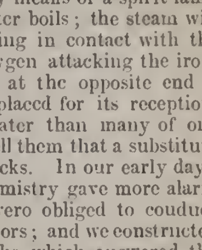
Ozone.—The peculiar effects of passing a large number of electric sparks through oxygen has long been known, and has attracted considerable attention — more especially that of Professor Schöenbein, who proposed to give it the name of *ozone*. Oxygen, thus treated, acquires more energetic affinities than in its ordinary state, and attacks both silver and mercury without the aid of heat; it likewise readily decomposes alkaline iodides with liberation of iodine. The true nature of ozone is not yet thoroughly known; it is almost certain, however, that it is only oxygen in a modified form—probably in its nascent condition.

HYDROGEN.

Hydrogen is a gas, the nature of which is indicated by its name, derived from ὕδωρ, water, and γεννάω, I engender. Like oxygen, it is a permanently elastic fluid, transparent, and colourless, and is sixteen times lighter than the former gas.

Water is a compound of hydrogen and oxygen, two volumes of the former to one of the latter; and hydrogen is always obtained in the laboratory by deoxidising the water—an operation of no great difficulty. There are different methods of accomplishing this. For example:—Take a porcelain tube, or an iron one—an old gun barrel will answer the purpose very well—and fill the middle part of it with little bundles of iron wire or small pieces of iron, such as nails; lay this across a furnace and to each end fix a glass tube, properly bent, in the manner we have already described. The Florence oil flask again comes into use. This must be half filled with water, the mouth being, carefully stopped by a perforated cork connected with the glass tube projecting from one end of the barrel; the glass tube at the other end of the barrel being so bent as to pass under water, for the purpose of allowing the gas to be collected in the ordinary manner. When the barrel or porcelain tube has become red hot, heat must be applied by means of a spirit lamp or a jet of gas to the flask until the water boils; the steam will pass off through the tube, and on coming in contact with the redhot iron will be decomposed, the oxygen attacking the iron, and the liberated hydrogen passing out at the opposite end of the tube, to be collected in the vessel placed for its reception. As the cost of a furnace would be greater than many of our younger readers could afford, we may tell them that a substitute may be easily made with a few loose bricks. In our early days, when our juvenile experiments in chemistry gave more alarm than satisfaction to our relatives, we were obliged to conduct those where fire was concerned out of doors; and we constructed a furnace against a wall with a few bricks, which answered the purpose as well as if we had spent a half year's pocket money in buying an orthodox one; the barrel was laid across the bricks, and then more bricks were added, so as to enable us to build the fire above it, so that it should be surrounded on all sides with fire. A flower-pot served to place the spirit lamp in to protect it from the wind, and a pan partly filled with water served as a pneumatic trough.

A simpler method of obtaining this gas, though a slower one, is as follows:—Take a tubulated glass retort, or what, perhaps, would be more convenient, a wide-mouthed bottle, and close it with a tight-fitting cork, having two holes bored through it, for the reception of two tubes. These holes may be burnt with a piece of red-hot wire, and afterwards enlarged and made smooth by means of a circular file. These holes are for the reception of two tubes: one straight, reaching nearly to the bottom of the bottle, with a funnel at the end; the other bent in such a form that it may be conveniently immersed in a vessel of water; the appearance it will then present being shown in the woodcut. Before fixing the cork, put into the bottle some very small pieces of zinc, or, if this cannot be got, some iron nails will answer the purpose, though not so well. Put in the cork and smear it over with wax, to prevent the escape of the gas, or the ingress of atmospheric air. Pour water through the funnel until the bottle is nearly half



full; then add a small quantity of sulphuric acid. Directly the acid comes in contact with the zinc, the decomposition of the water commences, the oxygen unites with the zinc, and forms an oxide, which is immediately dissolved by the acid, and forms the sulphate of oxide of zinc, a reaction which may be expressed thus:—

$Zn+SO_3+HO=ZnO.SO_3+H$.

The hydrogen passes out of the bottle through the bent tube and is collected in the usual manner. When the liberation of the gas appears to slacken, add a little more sulphuric acid, and the action will be renewed. This may be repeated until the zinc has disappeared. The sulphate may be obtained by evaporating the solution.

It is best to use the zinc in a granulated form. This is easily prepared by melting a lump in an earthen crucible and pouring it into a pan of cold water.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 24th October, 1859.

I PROMISED to give you some details of Professor Haidinger's paper "On the connection between the superficial and internal colouring of bodies," published some time ago in Prussia, and of which the *Annales de Chimie et de Physique* gave a long extract in 1855. The subject becomes more interesting every day, as optical science and photography advance.

Remarkable superficial colorations, quite distinct from the interior colour of bodies, have been noted for some years past, more especially by Professor Haidinger and Sir David Brewster. The phenomena in question consists in a coloration of metallic aspect, which various substances present when they are viewed by reflected light, and which is very different from their internal coloration. The light which produced this display of colour is generally polarised in a plane perpendicular to the plane of incidence. If we receive the reflected cone of light on the dichroscopic lens of M. Haidinger (an instrument composed of a parallelopipedon of calc-spar mounted in a tube, having at one extremity an ordinary lens, and at the other a diaphragm pierced with a small hole), the principal section of which is parallel to the plane of incidence, the metallic coloration is seen only parallel to the extraordinary image; the ordinary image presents quite a different tint, the aspect of which is not metallic.

If the substance examined be in crystals, the phenomena observed will depend naturally on the direction of the axes; but, in order to observe the effects, independently of the crystallisation, Professor Haidinger has the substances examined reduced to powder and spread upon a glass plate, when the superficial colour is seen by reflection and the internal colour by transmission. The following are the substances that have been observed; they are grouped according to their internal colour:—

RED SUBSTANCES.

1. *Murexoine*, a substance discovered by M. Rochleder in his researches on Caffeine, and having for formula $C_{36}\ H_{23}\ O_{15}\ N_{10}$. Its internal colour is carmine red; superficial colour, brass yellow, under the normal incidence; under oblique incidences, the light polarised in the plane of incidence is yellowish or white; the light polarised perpendicularly to the plane of incidence is at first golden yellow, then green, blue, and, finally, violet, as the incidence augments; these various colours present a very decided metallic appearance.

2. *Chrysammate of Potash* ($KO,\ C_{15}\ H_2\ N_2\ O_{12}$).—The crushed crystals spread like an amalgam over the glass, and present phenomena of coloration which depend on the position of the plane of polarisation of the incident light. If this plane is parallel to the line according to which the crystals are spread, the transmitted light is blood red, and the reflected light gradually passes from steel-grey to violet, as the incidence augments. If the plane of polarisation is perpendicular to the preceding direction, the transmitted light is carmine red, and the reflected light passes, as the incidence augments, from yellow of gold to green, blue, and finally to grey, without any determinate tint. The latter colours have all a metallic aspect.

3. *Sulpho-molybdate of Sulphuret of Potassium* (Ks,MoS_3).—Internal colour, scarlet; superficial colour, metallic greenish yellow; whatever may be the plane of polarisation.

4. *Cyanide of Platinum and Magnesium* ($Pt_5Mg_6Cy_{11}$).—Spread upon the glass, this substance appears red by transmitted light, and azure blue by reflection. If the crystals (prism with square base) are examined, their base appears carmine red by transmission; azure blue by reflection. If a lateral face of the prism be taken as the face of incidence, the ordinary transmitted light is carmine red, and the extraordinary light blood red; the reflected light, polarised parallel to the axis, is azure blue; the reflected light, polarised perpendicularly to the axis, is metallic green, and yellowish under great incidences.

ORANGE OR YELLOW SUBSTANCES.

1. *Cyanide of Platinum and Lithium.*—The crystals are of a deep yellow colour by transmission; they reflect light, polarised perpendicularly to the axis, of a metallic azure tint. Spread upon the glass, this body is deep yellow by transmission, and greenish by reflection, under the normal incidence. Under an oblique incidence, it reflects an azure tint of metallic aspect, polarised perpendicularly to the plane of incidence.

2. *Chromic Acid.*—Internal colour, carmine red; superficial colour, azure, in light polarised perpendicularly to the axis.

3. *Cyanide of Platinum and Magnesium.*—Internal colour, deep yellow; superficial colour, in light, polarised perpendicularly to the plane of incidence, azure blue.

4. *Iodine.*—Internal colour, orange; superficial colour, violet; polarised perpendicularly to the plane of incidence.

5. *Croconate of Copper.*—Internal colour, orange brown; superficial colour, azure blue; polarised perpendicularly to the plane of incidence.

6. *Iodide of Codeine.*—Internal colour, deep orange brown; superficial colour, blue or violet; polarised in a determined direction.

7. *Iodide of Lead.*—Internal colour, citron yellow; superficial colour, blue; polarised perpendicularly to the plane of incidence. Under great incidences, this colour passes to violet, and even to rose colour.

8. *Aloetinate of Potash.*—The crystals transmit light, polarised parallel to the axis, of a reddish yellow tint; and light, polarised perpendicularly, of a citron yellow tint; they reflect light, polarised parallel to the axis, with a bluish tint.

9. *Chrysolepic Acid.*—Internal colour, brilliant citron yellow; superficial colour, blue. In the dichroscopic lens the ordinary image appears of a blueish white, and the extraordinary image of a fine azure blue, when the plane of incidence is parallel to the principal section of the analyser.

10. *Cyanide of Platinum and Barium.*—The crystals transmit a pure yellow, if the incident light is polarised parallel to the axis; a yellow, mixed with red and green, if this light is polarised perpendicularly to the axis; under great incidences a blue, or even a violet tint is perceived.

11. *Cyanide of Platinum and Potassium.*—The crystals transmit a yellow light, the tint of which varies little with the position of the plane of polarisation; they reflect a blue light polarised perpendicularly to the axis.

12. *Chloride of Palladium.*—Internal colour, brown; superficial colour, blue polarised perpendicularly to the plane of incidence.

13. *Chrysalepate of Potash.*—This substance when pul-

verised transmits a pale brown light, and reflects azure blue polarised perpendicularly. The crystals transmit a dull brown, and reflect a dull blue polarised parallel to the principal axis.

GREEN SUBSTANCES.

1. *Cyanide of Platinum and Ammonium.*—The crystals transmit light, polarised parallel to the axis, of a citron yellow tint, and light, polarised perpendicularly, of an olive green tint. They reflect light, polarised perpendicularly to the axis, of a violet blue colour, which passes to a rose tint under great incidences.

2. *Oxide of Zinc.*—Internal colour, olive green; superficial colour, polarised perpendicularly to the plane of incidence, blue under feeble incidences, and yellow under great incidences.

BLUE SUBSTANCES.

1. *Prussian Blue.*—Internal colour, blue; superficial colour, red, not polarised.

2. *Indigo.*—Internal colour, blue; superficial colour, copper red, not polarised.

3. *Platino-hydrocyanic Acid* ($Pt.Cy_2H$).—Internal colour of a blueish black; superficial colour, copper red, polarised perpendicularly to the plane of incidence.

4. *Oxalate of Protoxide of Platinum.*—Internal colour of a dull blue; superficial colour, copper red. The crystals transmit, with a yellowish brown coloration, light polarised parallel to the axis, and with an indigo coloration, light polarised perpendicularly. They reflect light, polarised perpendicularly to the axis, of a bright copper red.

5. *Cyanide of Platinum and Potassium* (KCy_2+PtCy_2) + ($KCy+PtCy_4$).—Internal colour, blueish black; superficial colour, copper red. The crystals transmit light polarised parallel to the axis of an olive green tint; these crystals are almost entirely opaque to light polarised perpendicularly to the axis; the base of the prisms reflect a golden tint polarised perpendicularly to the plane of incidence; the lateral faces reflect the same tint polarised parallel to the axis and a copper tint polarised perpendicularly.

6. *Platino-hydrocyanate of Ammonia.*—The crystals transmit light polarised parallel to the axis with a straw-coloured tint, and light polarised perpendicularly to the axis of a deep blueish brown. They reflect light polarised perpendicularly to the axis with a copper red tint.

7. *Bitungstate of Soda.*—Internal colour, deep indigo; superficial colour, copper-red under the normal incidence, golden yellow under an oblique incidence, polarised perpendicularly to the plane of incidence.

VIOLET SUBSTANCES.

1. *Green Hydroquinon.*—Internal colour, deep violet; superficial colour, yellowish brown, without any determined polarisation. The green colour of the powder results from the mixture of the superficial yellow colour with the internal colour.

2. *Permanganate of Potash.*—Internal colour, of a dull violet; superficial colour, bronze yellow in light polarised parallel to the plane of incidence, green or blue in light polarised perpendicularly to this plane.

3. *Chloride of Iridium and Potassium* ($KCl+IrCl_2$).—Internal colour of a deep violet; superficial colour passing from bronze-yellow to blue, and polarised perpendicularly to the plane of incidence.

4. *Murexide.*—Internal colour of a dull violet; superficial colour, green (*pistache*) under the normal incidence; blue when polarised perpendicularly to the axis under great incidences. The crystals transmit light, polarised perpendicularly to the axis, with a violet tint, and are opaque to light polarised parallel to the axis. Reduced to very fine powder, they appear of a red-brown by transmission. The long sides of the prisms reflect light polarised perpendicularly to the axis with a bronze-yellow tint, and light polarised parallel to the axis with a blue tint. The narrow sides have an exactly inverse action.

It will be seen that, in most of these examples, the superficial colour is nearly complementary of the internal colour.

Dr. W. B. Herapath discovered a substance, a sort of ioduretted sulphate of quinine, which Haidinger has not mentioned. It possesses, if not the most remarkable, at least, the most brilliant dichroism of any substance hitherto known. The crystals, which are cubic, are of a vermilion red by transmission, whilst by reflection and according to the incidence, they show the most sumptuous metallic green or blue. My friend, M. Babinet, possesses a crystal of this remarkable substance, with which he has astonished many of his numerous visitors.

M. Schlagdenhauffen has just published an interesting note upon the action of chloride of lime on different sorts of ethers. It is well known that chloroform is produced in a variety of circumstances by the aid of this chloride (by *chloride of lime* is meant the commercial mixture of chloride of calcium and hypochlorite of lime used frequently in bleaching and disinfecting), and when chlorine comes in contact with certain organic mixtures. Thus, chloroform has been obtained by the action of chlorine gas on chloride of methyle and marsh gas—by the action of chloride of lime upon common alcohol, wood-spirit, potato-oil, acetone, and some essential oils. M. Schlagdenhauffen has studied the action of chloride of lime upon complex ethers. The mixture is placed in a large retort, and quietly heated. 100 grains of acetic ether *(acetate of ethyle)*, to which was added the same quantity of lime and 500 grains of chloride of lime with a certain quantity of water, gave, by distillation, at a moderate temperature, 25 grains of pure chloroform in the course of an hour. *Acetate of methyle* treated in the same manner gave 23 grains of pure chloroform. The *tartrates of ethyle* and *methyle* did not produce, when treated in the same manner, nearly so much chloroform as the corresponding acetates. *Formiate of ethyle*, in spite of its insolubility in water, is more easily decomposed by chloride of lime than the tartrates just mentioned, and furnishes 15 grains of chloroform.

Nitrite of ethyle is decomposed at the ordinary temperature of the air, the reaction is energetic, and the heat disengaged is such that a great quantity of the nitrite passes over. On being redistilled, with certain precautions, the whole of this nitrite can be transformed into chloroform.

Oxalic ethers gave very small quantities of chloroform; *benzoate of ethyle*, on the contrary, gave the one sixth of its weight of this substance, *i.e.*, 18 grains from 100 grains of benzoate.

Besides these decompositions, M. Schlagdenhauffen has operated two others, namely, that of *sulpho-vinate of lime*, and *tartro-vinate of lime*. When either of these organic salts are mixed with lime or chloride of lime, as above, the reaction takes place without the use of fire, the heat developed by the hydration of the lime being sufficient, and chloroform soon passes over. The temperature of the liquid being elevated a little towards the end of the experiment, about 8 per cent. of chloroform is obtained from these two substances.

By a letter dated from the Observatory of Blick, M. Luther announces the discovery of a new planet, which he saw, for the first time, on the 22nd of September last, 8h. 30m. in the evening. This new planet belongs to the group of telescopic planets which circulate between Mars and Jupiter; it forms, if I mistake not, the 57th of this group; it is seen as a star of the 10th magnitude, and has received the name of Mnemosyne.

A French agriculturist, M. Jules Gy, writes from Lenguidic (Morbihan) on a new method of planting potatoes, that has met, in his hands, with great success. From the mother stems he took cuttings, about one-fifth of a yard long, and planted them, about the end of May, in a black, light earth, and at a convenient distance one from the other. On the 22nd September he got in his crop, and was astonished at its beauty—so much the more, indeed, as this year has been a bad one for cuttings in general, and the potato

plantations of his neighbours presented many diseased tubercles; besides which, he adds, the black earth was not a favourable circumstance.

The Naples correspondent of one of the evening papers writes as follows on Vesuvius:—"As I have no political news, allow me to speak a little of our volcano. The phenomena that are now presenting themselves are beginning to cause uneasiness to the inhabitants of Portici and of Saint Jorio. A continuous and subterraneous eruption has been going on now for eighteen months past. In the annals of Vesuvius, which go back as far as the year 79, when Pompeii was swallowed up, and in the fifty eruptions that have been observed since, nothing similar to what is now taking place was ever noticed. The last opening of this volcano happened, as is known, after an earthquake, which occasioned a split in the great cone. According to M. Palmieri, director of the Vesuvian Observatory, the lava flows out subterraneously from the base of this cone, at a place called *Piano delle Ginestre*. . . . Since this opening was formed, the volcano, it is calculated, has vomited twenty-two millions of cubic metres of lava! Some experiments made by M. Palmieri show, that the temperature of this lava mounted to at least 1,000° (Réaumur). During the last few days frequent earthquakes have taken place; the shocks, although weak, are distinctly felt, and it is feared that they indicate the approach of an eruption."

Not long ago, Professor Icacchi, of Naples, addressed a letter to the French geologist, M. Charles St. Claire Deville, which read as follows:—"I don't know whether you are already aware that the lava of Vesuvius, which ran into the *Fosso della Vetrana* in 1855, was still, here and there, in an incandescent state as late as last autumn (1857), and also, that this lava has produced, by sublimation, a notable quantity of *cotunnite* (chloride of lead), of which I send you some samples, as this substance has been very rare here since 1822." It is certainly a curious fact, that lava, two years and a half old, should possess heat enough to present, here and there, portions in an incandescent state. Cotunnite has only been seen three times at Vesuvius (in 1822, 1840, and 1857), each time shortly after some great eruption.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

I HAD seen what appeared to me very much like carrying cleanliness to excess in Holland, but not even there did I ever see such scrupulous cleanliness as we met with in this inn, and, indeed, generally; but I was not so much struck with it afterwards, as in this particular instance, probably from greater familiarity. I thought, on looking at the interior of the rooms, at first, that the inn must be quite new, but it was not; the brightness and purity of everything arose from careful cleaning.

After the play was over, and we had refreshed ourselves, we walked down the village, in order that I might have an opportunity of seeing the poorer class of people. We found the street lined with men, women, and children, who were chattering away in the most good-humoured manner with each other. There was nothing which sounded like quarrelling; and even the very children seemed to show a degree of consideration for each other, wholly different to what I had observed among them in other countries. Such swarms of little laughing imps I never saw; to judge from appearances, every house must have averaged seven or eight in family. It was a pleasant sight, and far more gratifying than anything I had seen in the garden at the inn, to see the little ones climbing about their father, or a merry-faced, laughing fellow sprawling on the ground, and almost buried under a heap of boys and girls. And the little things were so polite and well-bred, too; the strangers were no sooner seen, than they sprang to their feet, and quietly saluted them as they passed—as, indeed, did their seniors also. I suppose the followers of Malthus would be very much shocked if they saw the numerous families which the poor Japanese generally have. How they live is a mystery to me. I have seen families of eight and ten, whose only known means of support were derived from a piece of ground less than one-fourth of an acre in size, and yet they seemed contented and happy. As we were walking along, we came to a poor-looking eating-house, where, besides stewed and baked snails, and other delicacies of a like kind, were a number of small cakes, all of which we bought for distribution among the youngsters, to their intense gratification, and, apparently, quite as much to the gratification of the grown-up people, who stood looking on. When the stock was exhausted, and we had paid the cost, we found it was getting dusk, so we returned to the inn, and as it was very hot, and we did not feel disposed to sleep, we stretched ourselves out in the balcony, and alternately looked at the stars and at the parties who were amusing themselves in the garden, until I fell into a sound sleep, from which I did not wake until after day-break. I was rather puzzled, on first waking, to find myself out of doors, but I had only to look at surrounding objects to recognise my position at once. I looked around for Dsetjuma, but he had disappeared. I did not trouble myself to seek for him, but dropping from the balcony into the garden, I sought out the bathing room, and, after a few minutes occupied in getting the fire to burn up, so as to generate a sufficient amount of steam, I unfastened my belt and let my clothes—which consisted of only two garments—fall to the ground, and crept through a narrow opening, which was immediately closed by a sliding panel, into the steaming room. The upper part of this room was so built that the steam could not escape, but around the lower part were fitted shutters which worked in grooves, and behind these shutters was close lattice work, so that the person undergoing the process of steaming could himself reduce the temperature of the room, if he felt disposed to do so. The centre of the floor was likewise formed of lattice-work, and it was through this that the steam was admitted into the room. The steam was impregnated with an aromatic smell, which was communicated to it by passing it through crushed plants. I did not much like the smell, but its effects were peculiar. It communicated a powerful stimulus to the nervous system, which lasted for some hours, which the Japanese, no doubt, find very agreeable, but which induced me to avoid the use of it afterwards, and to confine myself either to the cold bath, or, after a day's hard exercise, to the warm one. After as much steaming as I could endure, I pushed back the panel, and, going into the adjoining room, plunged for an instant into a big tub full of cold water, and, before the delicious sensation which this caused had gone off, I rubbed myself dry, and stepped out into the world a freshly-made man.

The atmosphere of the garden was full of the most delicious perfume, which was emitted from the flowers as the warm rays of the early morning sun fell upon them, and men were sitting about in it enjoying their existence, and sipping tea as they waited for the bathing rooms to be evacuated by the batch in possession. I was taking a turn round the garden, when I came upon Dsetjuma in the act of fixing the tent. He was surrounded by a group of curious individuals, who seemed much puzzled by the appearance of the tent, but did not take much notice of the camera, which, he told me, they imagined to be a new kind of instrument for surveying. I did not interfere in the operation at all, being interested in seeing what sort of a result he would obtain without assistance; and I was not much surprised when I found that the plate was covered with markings of a metallic character, as well as with sundry stains, which rendered it quite useless. He seemed very much discouraged by his failure; but a second attempt, in which I assisted him, being more successful, he recovered his spirits; and, as soon as the plate had been properly developed and fixed, he could not resist giving himself the pleasure of taking it outside and showing it to his countrymen. Loud were their expressions of admiration and

* Continued from vol. iii. p. 82.

astonishment when he held it up; and it gave me an excellent opportunity of observing the consideration these people have for each other. Instead of crowding one upon the other, and so preventing anybody from seeing satisfactorily, themselves included, they gave way to each other; and, though they continually returned to the charge to have another look, they were just as willing to give way, as soon as they had glanced at it. Dsetjuma had some difficulty in answering their questions, many of which, indeed, he could not answer at all, seeing that there are no words in the Japanese language capable of rendering some of the words required to express the theory of the formation of the heliographic picture, and the names of the substances employed, and, even if there had been, it is not likely he would have been understood.

(*To be continued.*)

Proceedings of Societies.

South London Photographic Society.

This Society held its first meeting for the ensuing session on the evening of October 20th—the Rev. F. F. Statham (President) in the chair.

The Chairman opened the proceedings by calling attention to the business of the evening, and concluded by promising to contribute some papers in the course of the session.

The Secretary, Mr. A. H. Wall, then addressed the meeting as follows:—This being, in point of fact, the first meeting of the "South London Photographic Society" devoted to its real business, I may, perhaps, be permitted to call attention to some few matters pertaining to its future purposes and existence. The ultimate amount of utility and success which such a society as we represent may command, appears to me to be dependent upon the proper combination of certain elements—viz., photographic chemistry, photographic optics, photographic manipulation, mechanics as applied to photographic apparatus, and, although "last, not least," that knowledge of the elementary principles of art, without which the learned chemist and talented optician, with all the manipulatory skill of a clever photographer, provided with the best of apparatus, cannot produce effective or pleasing results. I am sure it will gratify you to learn that, young as our society is, we have already amongst us efficient representatives of each and every branch I have enumerated. Not to be tedious, I will briefly add, that in Messrs. Statham, Ackland, Shadbolt, Noldwritt, and others, we have the necessary scientific element; that in Messrs. Leake, sen., Leake, jun., Cotton, Hook, Howard, Clarke, Hughes, Hervé, Chapel, Ackland, Shadbolt, and others, we have practical and professional photographers of no mean ability; that in some of the gentlemen already named we have excellent mechanists; and that in Messrs. Hervé, Keens, sen., Hannaford, Rogers, and others, we have artists of professional repute or amateur skill. As to our Secretary, we have in him a very "willing horse," but, I fear, one not sufficiently competent in branches of knowledge more practically photographic, as was stated previous to election. And now, having told you what we have, and with good cause congratulated you upon the same, I wish to conclude with a few words upon what we have not. Although we have as many, or more, members than we could reasonably expect, we have not enough. Members represent money, which, however vulgar in speech, is no less the sinews of art and science than of war. How, then, to increase our members, is a question of primary importance. There are, of course, many means for this end; but there is one which I more particularly desire to point out, and that is, by the formation of a circulating library of stereoscopic and other photographs, for the benefit of members. This we may very speedily obtain, if such of our members as possess negatives will generously present their society with positives from them, and also appeal for the same to their photographic friends, *in the name of a society devoted to the advancement of photographic art and science, which, in common with every similar institution, has a just claim upon their kindly sympathy and support.* By doing this, we offer attractions for those who, without being practical photographers, would be glad to secure such an advantage; and by thus increasing the society's funds, we enable the committee to organise and bring about fresh advantages for present members, and, consequently, new inducements for non-members. It is hardly necessary to state that, as Secretary, I shall very gratefully acknowledge any such contributions, from whatever quarter they may arrive, as also any letters relative to the exhibition of pictures, apparatus, &c., the reading of papers, or names for nomination and election at our meetings.

The President having seconded Mr. Wall's appeal for the folio, and called attention to a few other objects connected with the society,

Mr. H. L. Keens, sen., was called upon to read a paper entitled, "Truth in Art, illustrated by Photography."

A vote of thanks was awarded to Mr. Keens for his interesting paper.

Mr. Leake, jun., then read a paper entitled, "Practical Hints upon Positive Printing," prefacing the same by remarking that, as it was intended solely for beginners, the gentlemen present must not expect an elaborate paper upon the theory of positive printing. He merely intended to offer a few hints, which he thought might be useful at a time like the present, when most amateurs, having returned from their photographic tours loaded with negatives, were anxiously considering how they might produce from them the best positive prints. To assist them in the accomplishment of their purpose, he proffered the results of his own practical experience, in the following words:—

"I think that to produce good and permanent prints will put all the good qualities of the operator to the test, and, consequently, the notion, 'that to find a positive is the easiest thing in the world,' had better be at once scouted, and the idea that it will require all the care and skill of which the operator is master, be substituted in its place.

"I shall first notice the paper. I always use Saxony, if procurable; if not, I prefer Canson's. I like it of a medium thickness, as I find, if too thin, the prints are deficient, or, if too thick, it is, when albumenised, very difficult to tone. As a rule, the thick will give the richest print. I suppose nearly all the amateurs procure their paper ready albumenised, and this is the best and cheapest plan, if a small quantity be required, the only precaution necessary being to procure it of a good maker, as an inferior paper is 'dear at any price,' leading, as it does, only to disappointment and disgust.

"I must next notice the albumenising and salting. Enough albumen should be used to give a fair gloss, but it must be borne in mind, that it is not used merely to give a glaze, but to impart a vigour and richness to the prints, which cannot be obtained by any other means. I think too much albumen gives an amount of gloss which destroys the artistic effect of the proof, and, no doubt, retards the toning to a great degree. If, however, it can be toned without sulphuration, the resulting pictures will be of a very rich deep tone. If, on the other hand, too small a quantity be used, the pictures will tone more rapidly, but will be wanting in richness and depth, and will approach, in effect, prints on plain paper. In selecting a sample of albumenised paper, it will be remembered that it is not always that with a most glossy surface which will contain the most albumen, or give the finest results, as some varieties are glazed by hot-pressing or some other method: this will soon show itself, as, in the sensitising and subsequent processes, it will lose most of its surface. I prefer a paper with enough pure albumen to give a nice even surface, without being too highly glazed. Owing to the differences of the sizing, &c., of various papers, the proportions necessary for this result can be determined only by experiment. As regards the salting when albumen is used, a less quantity will be required in solution than will be needed for plain paper, as the albumen will retain more of it on the surface.

"The quality and tone of the print is materially affected by the portion of salt; a highly-salted paper giving, with a proportionate quantity of silver in the sensitising bath, a richer and more brilliant print, than one slightly salted. As I have not prepared any great quantity of albumenised paper myself, I cannot give any positive rules or formula for the process, but must refer the amateur to one of the many works treating of this subject. Albumenised paper *cannot be used too fresh.* I have no doubt that much of the trouble and disappointment met with in positive printing is owing to the decomposition of the albumen. I once had a quantity of paper handed over for my use, which, when laid in the silver bath for sensitising, left the albumen and salt floating in the solution—a disagreeable which I found attributable to this cause only, the same bath giving perfect results with a fresh sample of paper of the same make. I think it a good plan to dry the paper gently at a distance from the fire, if it seems at all damp, or if it be damp weather, immediately before placing it on the sensitising bath. I shall now notice a sensitising process. Albumen paper should always be sensitised by floating; a 50 grain solution is generally considered to be of sufficient strength, and, no doubt, is, for some qualities of paper, while, for others, a much stronger bath will be necessary; of course

this will have to be regulated by, and adjusted to, the quantity of salt retained by the albumen, and it is much to be regretted that the manufacturers of albumenised paper do not specify, as a rule, the amount of salt used in its preparation. As the negatives from which I print are generally portraits, very soft, without great intensity, I prefer a bath of from 80 to 100 grains; this will give a very fine toned proof. At any rate, the amount of nitrate should not be allowed to fall below 60 grains, except to print from a very hard negative. It must be remembered that the colour of the prints is, to a great extent, affected by this cause, a weak bath giving a cold and faded appearance, while prints from a bath of full strength will, if from a good negative, be of a fine, rich, deep, and warm tone. You need not be afraid of having the silver bath too strong, as it will diminish rapidly by use, and will take a very large excess to spoil a print, though a slight deficiency will do so most effectually. Some operators recommend the addition of a small quantity of acetic acid to the sensitising bath; I consider this a most doubtful proceeding (in fact, it may be mere prejudice), but I do not like acid in any part of the printing process, and always avoid it, if possible; if the bath becomes alkaline by use, which may be known by its removing the albumen, enough acid should be added to neutralise, but not acidify it. I generally keep a little kaolin at the bottom of the bottle in which the bath is kept; this keeps it of a nice colour, and it *looks* cleaner if it is not. From three to five minutes will generally be found sufficiently long for the floating. I think it should not be allowed a much longer time, as the solution penetrates the albumen, and is absorbed by the paper, which it rapidly discolours. The paper should not be sensitised long before use, if the finest results are desired, as it becomes yellow, and the prints look cold when toned. I sensitise my paper the morning I intend to use it, dry it gently at some distance from the fire, and place in a folio between clean blotting paper, for use. The only precaution necessary, in the exposure to light, is to keep the paper in contact with the negative; it will be found most negatives print better in the shade than in the direct rays of the sun, but I think a little depth is sometimes gained by a short exposure to sunlight, by way of finish; this, however, is mere supposition, and I give it for what it is worth.

"I now come to the most critical and difficult part of the process—the fixing and toning; to perform this operation properly will require a great deal of care. The primary object most photographers seem to have in view, is to produce black tones; black they will have, by hook or by crook, and, unfortunately, whether obtained by *sulphur or gold*. The toning bath I would recommend for general use is the old one for toning and fixing in an operation, the formula for which is so well known that I need not repeat it, but will merely remark that very exact proportions are not essential. I have tried most of the new baths, but although some of them give very excellent results, I think quite as good may be obtained, *with more certainty* and less trouble, by the old one. Upon removal from the printing frame, the proof should be washed in common water till it ceases to flow milky, in order to remove the free nitrate. I consider this important, if *permanence be desired*, for two reasons,—in the first place, it prevents that sulphuretting process which is so invariably set upon the addition of nitrate of silver to the hyposulphite bath; and in the second, it gives the alarm when the supply of gold falls short, as the prints will then tone with great difficulty and slowness. The utmost care should be taken to prevent acidity of the bath, which may arise from various causes. In hot weather it will often become acid spontaneously, but more often from the chloride of gold containing free hydrochloric acid. To prevent, as much as possible, inconvenience from this cause, I use two toning baths, on alternate days, and immediately after use replace the gold I consider to have been abstracted by prints toned. By this method 18 hours are allowed to elapse between adding gold and using the bath, thus giving time for the deposition of the sulphur, and consequently neutralisation of the bath. Some operators actually recommend the addition of a small quantity of acid to the toning bath; when this is done, the bath assumes a milky appearance, and the prints being immersed in it pass rapidly to a very dark tone, though, in all probability, they are sulphuretted to a very high degree, and, consequently, are *not permanent*. To remove any acidity which may arise, I use a trace of ammonia, or, if preferred, a little chalk may be kept at the bottom of the bottle in which the bath is; the exact quantity of gold used has not, I believe, been accurately determined, but I do not think more than two prints, 10 + 8, can be properly toned by each grain, and, if very fine tones be desired, a larger quantity may be used.

"To keep up the fixing power of the bath, I retain a few crystals of hyposulphite at the bottom of the bottle; if this be done, no further fixing of the proof will be required. It is better not to use a toning bath too long, as it will, notwithstanding every precaution, acquire toning properties, even in the absence of gold; and the accumulation of organic matter will render its use dangerous. I would recommend that the toning process be conducted as soon after exposure as possible; if, however, they are placed in a dish of clean water, they will keep some time without receiving much injury.

"In toning albumenised prints it should be remembered that the natural colour of the photographic image *on albumen* is pale red, and that, in consequence, it will require a more energetic toning bath to produce black tone *on it* than on plain salted paper, and also that a very prolonged immersion in the bath is favourable to sulphuration—yellowness of the whites and subsequent fading. I therefore think it preferable to be contented with the really beautiful tint attainable by this process, before the black tones are reached, rather than obtain the black tones and endanger their permanence. When removed from the toning bath the proofs should be well rinsed in cold water *frequently*, as it is essential to remove every trace of the hypo. as *quickly* and *thoroughly* as possible. To effect this, the prints should be placed in a dish of water and turned over several times, the water then poured away, a fresh supply added, and the process repeated. They may then be placed in a large vessel, and a stream of water allowed to pass through them for some hours; the water being repeatedly and entirely poured off. It will not suffice to turn on the water and leave the prints to take care of themselves, but they must be frequently turned over and so separated as to insure each picture a thorough washing. A prolonged soaking is, I consider, quite unnecessary, from 12 to 16 hours being amply sufficient. Some operators recommend washing in hot water, by way of finish, but if the care I have advised be taken, this will not be required. When properly washed, at a moderate distance from the fire—ironed between blotting-paper, and mounted with a very strong solution of gum (taking care that it is freshly mixed), the prints will be greatly improved by hot-pressing, and, as this may be done very cheaply, I would commend the process for general adoption.

"To recapitulate: I consider that to ensure the best results obtainable by this method of positive printing, the following conditions are necessary:—The paper should be of moderate thickness, and retain a fair proportion of albumen and salt on its surface; the exciting bath should be neutral, and of full strength; the free nitrate must be removed before immersion in the toning bath, and this bath itself have its supply of gold well maintained; the proofs must be well rinsed on removal from the toning bath, and the operations of sensitising, exposing, and toning performed, if possible, on the same day."

Several very beautiful specimens of photographic portraiture were handed round as Mr. Leake's productions, by the process he had described.

Thanks having been voted to Mr. Leake for his able and evidently practical paper,

The Chairman hoped to hear some remarks from the practical photographers before him. He would take that opportunity of impressing upon the gentlemen present the importance of anything unusual which might occur in their photographic practice. It was his belief that no art was so much indebted to accident for its discoveries and improvements as photography. If every gentleman in whose experience a fact transpired for which he could not account would just make a note of it, or bring it forward at these meetings, he had no doubt but they would form a very curious, interesting, and suggestive collection, which might ultimately lead to most valuable and highly important results.

Mr. Hannaford thought the subject of positive printing one of vital importance, and that hints upon such a subject deserved their best thanks. In looking over our prints we all found the greater or smaller per centage of them faded, but whether photographs toned by the alkaline gold process would prove more uniformly permanent than those taken by the old process or not, time only would decide; but as we were not sure that the old toning came from gold and not from sulphur, and as the prints remained but a short time in the fixing solution, it appeared to him that the advantages were in favour of the alkaline toning bath. He had tried Maxwell Lyte's process with the phosphate of soda with great success. Recently he had employed acetate of soda with the gold; the advantage gained by it was, that over-exposed prints could be toned down very considerably, and, on the addition of a small quantity of carbonate of soda, prints would continue to darken with but little further reduction. He had made a great number of experiments in printing with the salts of various metals—iron, copper, cobalt, &c.—and exhibited a few specimens in iron. His only difficulty was in procuring pure whites. He did not at present think that any of these new processes would ever supersede the use of silver, but they formed subjects for interesting experiments, and might, probably, lead to some very useful results. Upon this subject, however, he hoped at some future time to read a paper.

Mr. Howard stated that he must certainly agree with Mr. Hannaford in regard to the alkaline chloride of gold bath, as, by using the bath advocated by Mr. Leake, he had met with a deal of trouble in the discolouration of his prints, and since he had ceased using it, he had found no symptoms of fading, the whites being always good and pure. In the hands of professional

printers the specimens before them proved that good results were obtained by Mr. Leake's process, but he thought amateurs would derive greater satisfaction from using the other bath, and concluded by regretting that he was not chemist enough to advance any stronger arguments.

Mr. Hughes thought the old bath theoretically defective—we never knew if the tones of its prints were due to sulphur or gold; but in using the alkaline bath we were at least sure that sulphur had nothing to do with the toning; and by its use we could easily obtain any colour we chose, from a warm chestnut brown, through the purples, into violet black, or, for those who sought it, a cold inky black. Its economy was great, for with one grain of gold he could tone five hundred square inches of albumenised paper, as he had proved by experiment.

Some prints were now examined, the peculiar yellow mottled appearance of which was attributed by Mr. Hughes to the use of too weak a solution of the hyposulphite (or, possibly, from not being exposed to its action long enough.)

The Chairman announced a paper by Mr. W. Ackland, on "The Difficulties of the Dry Processes," for the next meeting, which takes place on Thursday, November 17th.

Mr. Hannaford promised to make use of the Chairman's excellent suggestion, and bring down for the same meeting a few "photographic jottings."

After a few concluding remarks by the Secretary, the meeting proceeded to elect new members.

The following gentlemen were proposed and elected:—Messrs. Armstrong, Luckin, Hook, Hughes, Chapel, Wood, Noldwritt, Otley, Stevens, and Keens, and the business terminated with a cordial vote of thanks to the Chairman.

Miscellaneous.

Observations on Saturn's Ring.—According to very recent observations Saturn's ring is divided into *three* separate rings, which, from the calculations of Mr. Bond, an American astronomer, must be fluid. He is of opinion that the number of rings is continually changing, and that their maximum number, in the normal condition of the mass, does not exceed *twenty*. Mr. Bond likewise maintains that the power which sustains the centre of gravity of the *ring* is not in the planet itself, but in its satellites, and the satellites, though constantly disturbing the ring, actually sustain it in the very act of perturbation. M. Struve and Mr. Bond have lately studied with the great Munich telescope, at the observatory of Pulkowa, the *third* ring of Saturn which Messrs. Lassell and Bond discovered to be fluid. They saw distinctly the dark interval between this fluid ring and the two old ones, and even measured its dimensions; and they perceived at its inner margin an edge feebly illuminated, which they thought might be the commencement of a fourth ring. These astronomers are of opinion that the fluid ring is not of very recent formation, and that it is not subject to rapid change, and they have come to this extraordinary conclusion—that the inner border of the ring has, since the time of Huygens, been gradually approaching to the body of Saturn, and that *we may expect, sooner or later, perhaps in some dozen years, to see the rings united with the body of the planet.* But this theory is by other observers pronounced untenable.—*Curiosities of Science.*

Photographic Notes and Queries.

BINOCULAR VISION AND THE STEREOSCOPE.

Sir,—If you think the following notes of some simple experiments, connected with vision and the stereoscope, are likely to interest your readers, I place them at your service, because I think it is the duty of all observers, however trifling the results of their experiments may appear, to record them, so that any new facts may be published abroad, and the attention of more competent observers be directed to the subject.

If a small engraving or photograph be placed in the stereoscope, so that a half is seen on each side of the diaphragm, on looking into the instrument in the ordinary manner the picture appears to be bisected and transposed, the half seen by the right eye appears on the left side, and that seen by the left eye on the right. If the diaphragm is removed, the picture is seen entire, or rather, two entire pictures are seen, separated by the same space as that which divided the halves.

If the same picture be now cut into two parts, in a direction parallel to the sides, or diagonally, and these parts be placed in a reversed position in the stereoscope, taking care that the lower edges are in an exact line, on looking through the glasses the picture will be seen to be restored. The line of bisection will be visible, and the halves of the picture may not appear equally distinct; but generally it will be readily seen in its complete condition, however irregular and fantastic the line of section may be. It is necessary that the centres of each half should not be further apart than the distance between the pupils of the observer's eyes, or a portion of the picture corresponding with the excess of separation will be invisible; on the other hand, if the halves are too near each other, a blank space equal to the error will be seen between them. The unequal vividness of the parts is, no doubt, caused by the unequal powers of the eyes; and, in accordance with the well-known law, that exercise strengthens the organs, the right eye being generally more in use than the left, the impression received by it from the right half of the picture is the strongest, and *vice versa*. But note, that the impression received by the right eye is thrown to the left side, and that by the left eye to the right side.

For a picture any small object may be substituted, and the same results obtained by placing its halves in the stereoscope.

The phenomena may be observed without the aid of the instrument, by confining the eyes to their respective halves of the picture, by means of a piece of cardboard held between them, after the manner of a diaphragm. It will be necessary to look steadfastly at the halves for a few seconds; indeed, a stereogram may be examined in this way without an instrument, but of course the *magnified* image is wanting.

It will be seen from this experiment that the stereoscopic combination of images does not depend, as Mr. Hardwich says in his "Photographic Manual," upon the power of "squinting strongly, or turning the eyes inward towards the nose, until the right eye looks at the left object, and the left at the right," for the cardboard entirely prevents the eyes from wandering to opposite sides of the field of vision, and compels them to look only at the object before them; for in order to see a stereogram, or a pair of objects stereoscopically, it is necessary that the eyes should be prevented from acting con-sensually, else the two pictures presented are seen by each eye. A determined effort of a *mental* kind is necessary to keep the eyes rigidly fixed on their own objects alone, and if the objects presented are similar in size and form, and are placed on the same plane, they coalesce and form one, which appears in its natural relief or solidity, if each picture represent the object delineated, as it would be seen by the *single* eye, to which it is presented in the stereoscope. If, however, the objects are dissimilar, such as the halves of a picture, or of a flower, &c., they are transposed, and are both visible.

With regard to *colour* the result is curious, but just what might be anticipated. If coloured wafers are experimented with, it will be found, on the coalition of the forms, that the resulting colour is what would be obtained by the ordinary mingling of two colours, viz.—a blue and yellow wafer produce a green; a red and blue, a purple; and a yellow and red, an orange. A stereoscopic slide of *mosaic* pattern might be made to illustrate this property, and form a pleasing addition to the wonders of the stereoscope. The squares and triangles composing it, should be coloured in different hues, so as to produce the effect desired by the union of the colours.

Anatomists and physiologists have pointed out the decussation of the fibres of the optic nerve, and conjectured that it is by means of this arrangement that the two eyes convey

only *one* impression of the objects seen to the sensorium. The foregoing experiments appear to point out to us, also, that the impression received by the eyes is reflected to opposite sides of the brain, and this phenomenon is in all probability the result of the decussation spoken of; for by what other theory can we account for the transposition?

NEMO.

CONSTRUCTION OF A GLASS BATH.

SIR,—I am much obliged to your correspondent for his excellent method of constructing a glass bath. It must be a boon to any one suffering, as I have been, from impure gutta percha.

In building one after T. P. Bath's plan, a few improvements suggested themselves, which, I think, render the vessel quite as convenient as any other kind:—

1. The glass should be yellow, if it can be obtained *flat* enough, which will save the inconvenience of a covering, and will match the colour of the shellac cement.

2. The end and side slips ought to overlap each other, alternately, at the bottom corners, and those composing one side might be bevelled at the top, to form a spout.

3. Supports may be made by cementing together, and to the back of the bath, a number of graduated slips.

4. That the vessel may look and stand the better in an inclined position, the body should be formed a twist. This will easily be done, either by grinding down or by allowing the slips to overhang each other at the top and bottom, forming steps.

With the above bath, which measures 10×8 outside, I can sensitise a plate $8\frac{1}{2} \times 6\frac{1}{2}$, with 12oz. of solution, being little more than *half* that required with the "Company's" ordinary gutta percha bath.

C. CRAIG.

GUTTA PERCHA BATHS.

SIR,—Your correspondent, "W. L." (p. 35), will find, if he has not as yet found, that the acetate of soda (or, indeed, acid alone) is only a palliative against the apparently chronic disease of an old gutta percha bath.

My gutta percha baths behaved just as treacherously as "W. L.'s," and, after treating the nitrate baths with repeated doses of acetic, nitric, and citric acids, and once with acetate of soda, with the same result, viz., the return of the evil, I emptied, washed, and dried the vessels, and coated them three times with a thin solution of shellac in naphtha (not expensive alcohol), and they are now as good as glass baths.

The gutta percha baths are marked with the Company's stamp. They were perfect up to about May last, when I found them leaking at the bottom joints. During that time, and also after they were mended, the plates had the defects so frequently complained of, which, however, have not recurred after the coating with shellac.

Allow me to caution your readers against imitating the Lyons experiment, of employing hydrochloric acid for keeping up moisture. This acid has a most pernicious effect upon anything in the shape of iron. Even the interior of watches is penetrated by it, and screws and other iron or steel parts corroded.

Those photographers who use hydrochloric acid will do well to keep it in best stoppered bottles, or else they will be subject to the annoyance just mentioned.

N. ENNEL.

PRESERVATION OF SENSITIVE PLATES IN DEAL BOXES.

SIR,—I this morning used two plates prepared by the raspberry-vinegar process for printing transparencies: the plates were prepared about the middle of May, and were kept in a *deal* box during the summer; they developed as clean and quickly as if freshly prepared. I exposed them two seconds; the morning was dark and foggy. I have heard a great deal said against the use of deal boxes for dry plates, but have always found them at least as good as mahogany or tin.

H. M.

FIXING REDEVELOPED PICTURES.

SIR,—In reply to the question asked by "S. B." in vol. iii. p. 11, I may say that it is not necessary to use any fixing agent for a picture after it has been treated with iodine of pyrogallic solution, unless the collodion be such as gives a primrose film of iodide of silver when the iodine solution is first applied.

R. J. FOWLER.

Leeds, 13, Briggate.

TO CORRESPONDENTS.

GEO. writes as follows:—"I rejoice that ever the pages of the 'PHOTOGRAPHIC NEWS' came under my notice, for by their aid I have been enabled to overcome many difficulties which it would have been impossible to accomplish otherwise. The 'PHOTOGRAPHIC NEWS' is, indeed, a copious source of knowledge and information, and well calculated to help the tyro through all obstacles, as I myself have proved it to be. Whenever I am 'in a fix' I always consult the pages of the 'NEWS,' and by the aid of the copious index which you have furnished, the subject is found at once. I am greatly indebted to the gentlemen who have contributed so plentifully to your columns, thereby affording to the inexperienced their useful knowledge and the benefit of their experience as well as experiments. Through Mr. Hardwich's contribution I have been enabled to convert positives into negatives with great success. The process to which I refer is the one published in the forty-sixth number of the 'NEWS,' page 230, in which the mixture of iodine and iodide of potassium is used. One advantage is that it can be carried on in open daylight, and I can safely recommend it. It would be a boon to photographers if some one would kindly publish a good process for producing enlarged positives from negatives." It is a great source of satisfaction for us to find that our labours in the cause of photographic science are of service to our correspondents. We are always ready to give the best advice in our power, provided we can find out what it is that the querist really wants (no easy task sometimes). 1. A pale collodion and a bath as nearly neutral as possible (*tending* towards acidity) are requisites for taking very rapid pictures. In cold weather slightly warm the bath, glass plate, and developing solution. For a good formula for the latter see vol. i., p. 240. 2. Be sure and test a second-hand lens well before you decide upon purchasing it. 3. Large views, if well taken, will always command a higher price than stereograms, although not quite in proportion to their size.

M. A. O.—The specimens sent are hardly good enough to enable us to insert our correspondent's name as a member of the Club; but, with perseverance, we have no doubt that "M. A. O." will not be long before sufficient improvement has taken place to enable us to grant the request, as the progress made in a few months is very creditable, and much more than is usually the case. The fault seems to be principally owing to inexperience in coating the plate, and spreading the developing solution evenly. Some also appear to have been exposed incorrectly. One of them—"The Knife Grinder"—is really very good, and, were the others equal to it, would have caused us to hesitate before stating what we have. We shall be very glad to assist "M. A. O." as far as we can; and in order that our correspondent may not be ignorant of the amount of excellence required, we will forward a few stereograms in exchange for those received. By this means, "M. A. O." will be enabled to share some of the advantages of belonging to the Club, without causing disappointment to the other members.

PHOTO. BEYOND RAILWAYS.—1. We are quite unable to explain the phenomenon. 2. Plain or waxed paper negatives may be intensified by coating them with a dilute developing solution made with silver and gallic acid, after they are fixed and thoroughly washed. This must be done in the dark, and with great care to have everything clean, as stains will otherwise appear.

A. B. C.—1. Something must be wrong with your gutta percha bath; use a glass one, and make fresh solution: you can obtain the silver from your old one by precipitating as recently recommended in our pages. 2. One grain of gold is sufficient for six ounces of water. 3. Try the Fothergill or collodio-albumen process.

T. A.—Received. We do not see our way to make any use of our correspondent's communications, as the arguments contained therein are quite insufficient to overturn the theories universally accepted on the subjects discussed.

F. S. C.—You will find either "Fresenius's Chemical Analysis," or "Abel and Bloxam's Handbook to Chemistry," very good works for the study of chemical analysis.

ONE IN THE NORTH.—The stereogram of Lynton is very good: one of the pictures has, however, been moved during printing, and the lines are consequently double in some places. Your name shall be inserted in the list.

ROLIN B.—The "PHOTOGRAPHIC NEWS ALMANACK" for 1860 will be printed on slightly smaller paper than the one for 1859, but an increased number of pages will be given. We cannot recommend any particular house for the purchase of chemicals

A YOUNG BEGINNER.—Increase the strength of your sensitising bath, and allow the paper to remain longer in contact with it. Gelatine should not be mixed with the albumen.

T. OSMOND.—Our opinion of the photogen was given in p. 206 of our first volume.

A PHOTOGRAPHER will find all the information he requires in a paper by Mr. Watt, given in one of the early numbers of the present volume.

H. MIREHOUSE.—We will make inquiry through our correspondent, and, if we can obtain any further information, will communicate with you.

W. L.—We will consider your proposition.

Communication declined with thanks.—T. C.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—P. O. Y.—Graphia.—Q. P. S.—M. R. S. T.

IN TYPE:—J. W. Robson.—An Artist and Photographer.—LL. B. Cantab.—C. B. G.—G. H. W.—B. M. Bruckenridge.—J. N.—M. A. Root.—An Amateur.—I. B.—J. F. G.

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 61.—*November* 4, 1859.

PHOTOGRAPHY AND MEDICAL SCIENCE.

"Novus ab integro nascitur rerum ordo."

It is a good old English saying, yet a truism withal, that if every one were to take care of himself, all would be well cared for. Thus it is with the scope of any journal devoted to an especial purpose, or any especial science or art. The advocacy of photography, however, is the more natural, as this *new art* has—what is not the case with other branches of human enterprise, done and accomplished hitherto everything which could have been expected of it. This, however, could not have been done, if chemistry had not arrived at that high pitch of perfection; and if, what is equally weighty, the *general mind* of the nation had not been sufficiently advanced to receive, foster, and practise this invention. Hence, therefore, as is the case with a well-appointed curricle driven on a plain and level road, the adepts in and *fautors* of photography have but to direct its course onward, and to profit by every opportunity to accelerate its progress. Thus, the chemical photographer and mechanist are straining every nerve to discover new compounds and combinations, to devise new procedures and manipulations; while the Philosophy of photography reflects and ponders on what *has* been done, and what has yet *to be done*. Similar subjects have been taken up most ably by others of late; but still, in spite of all that has been hitherto accomplished, they seem nearly inexhaustible.

We shall speak on this occasion of the use of photography in reference to medical science in its widest signification, up to the confines of anthropology and ethnography; and in this instance we meet, at the very outset, with the name of a great man, with whom to begin our inquiry. It was Professor Blumenbach, of Göttingen, who first seized the idea of collecting, in various parts of the world, the skulls of different nations. His example has since been followed in various ways, and the plates of the *Crania Americana* make it one of the finest works of the kind. But what are the delineations of hurried travellers or half-skilled designers compared with those of our art, under every one of which the great Maker's monograph—*Sol fecit*—might be placed?

It would carry us too far here to dilate on the rules for the selection of such skulls in different parts of the world, the various aspects under which they are to be represented, &c. But there is an idea which will obtrude itself on many of our readers—that the time is come, or is coming, when the various branches of photography will have to be subdivided, as those of the painter and draughtsman have been long ago; and that we shall hear, by-and-by, of anatomical photographers, botanical, zoological, architectural, and the like. And this idea implies that, with the exception of those who practise photography as a mere *recreation*, none can adopt photography, as a profession, without studying also the subjects of that peculiar branch to which they intend to apply themselves.

Next to the delineation of (osseous) skulls, that of the heads of various nations and tribes is most interesting. At first, one might think that London was the worst place for making such a collection of the portraits of aboriginal and *strange* people, whereas, in reality, it is the best. We have seen, in our streets, African negroes six feet high, and of as primeval a character as though they had just arrived from the swamps of the Gaboon. In London, we may portray kings if not queens of the Cannibal Islands, Persian ministers, Siam princes; and, in the purlieus of Whitechapel, Malays, New Zealanders, Turks, Egyptians—a real Noah's ark of humanity. A selected collection of such portraits would be worth its weight in gold, even in St. Petersburg, Paris, or New York.

But we have completed, so far, the ethnographic part of this essay, and proceed now to the more physical and medical. Whatever perfection Egyptian, Greek, or Roman statues and busts may exhibit, yet the inquirer into the physical condition (health) of man asks himself—"What were the men of former times, relative to their physical condition?" If we go back to the 16th century, Sebastian del Piombo gives his portraits a certain sturdy, manly appearance; and, from an examination of the portraits of Titian and other masters, we may infer that, not only did the men of those times—or, at least, those belonging to the higher classes—possess the characteristics of a noble, chivalrous race, but that the gentler sex also shared this evident superiority. The *documents*, however, which photography will be able to leave behind, in reference to the general *character* of the people of this age, will surpass everything hitherto accomplished, as the monograph—*Sol pinxit*—admits of no doubt or uncertainty. Besides the subjects just enumerated, there are the several great tribes and types of *race* which are to be depicted and delineated. Dr. Knox, in his original but incomplete work, "The Races of Men," has given some adequate lithographs of the Welch and Hebrew races in this country; but what is this compared with what *now* can be done?—the more urgent, as real types of the Celtic, the Saxon, the Norman, and the Picts, are becoming every day more scarce. A tour in the Highlands, and in Ireland, may thus be made additionally attractive. We may remark, therefore, in conclusion, that, although photography has hitherto only been resorted to occasionally for the purpose of illustrating the pages of periodical literature, the time is arriving when, on account of its great accuracy, quickness of production, and moderate price, it will be generally adopted in the best works on art and science, and thus materially assist the *onward* culture of the human mind.

PYROXYLINE CONSIDERED IN ITS CHEMICAL ASPECT.*

BY M. VAN MONKHOVEN.

Of the varieties of Pyroxyline.—The elementary analysis of pyroxyline has excited much discussion amongst the learned, who have been engaged in its study. Nevertheless, it is generally agreed that the composition of pyroxyline varies according to the mode of preparation employed. Indeed, it is not sufficient to steep cotton in a mixture of sulphuric and nitric acids in order to obtain gun-cotton; a series of precautions are necessary, which may be theoretically indicated beforehand, and are the subjects of this article.

Anhydrous nitric and sulphuric acid are solid substances, which, when exposed to the air, attract its moisture with great rapidity, and become considerably heated in mixing with an equivalent of water. These two acids then both become liquid, and are called *mono-hydrated*. If, in the former, some cotton be steeped in the cold, a substance is obtained of sufficiently variable properties, but which, nevertheless, is very explosive, and not very soluble in alcoholised ether. If, instead of so concentrated an acid, one of weaker quality be used, a pyroxyline may be obtained easily soluble in alcoholised ether, but not very explosive.

Thus it may be seen, it is very important, in the practice of photography, to study the different modes of formation of this body; at the same time, that the varieties obtained should be compared amongst themselves, in order to determine which should be chosen.

We have already said, when cotton is immersed in nitric acid it absorbs this acid whilst giving up water. Hence it follows that the more cotton is prepared in concentrated nitric acid, the more the latter is diluted by the quantity of water withdrawn from the cotton. It is, besides, a curious property of cotton, to be completely dissolved in nitric acid, with disengagement of hypo-nitric acid.

If, therefore, too large a quantity of cotton be immersed in mono-hydrated nitric acid, the liquor will slowly become red, and will then suddenly become decomposed, and discharge abundant red vapour.

The addition of sulphuric acid is to prevent this decomposition. Indeed, this acid has a very great affinity for water; so that, if a mixture be made of nitric and sulphuric acid in proper proportions, and cotton be steeped therein, the latter will not be dissolved, because the water which it discharges is immediately absorbed by the sulphuric acid.

Sulphuric acid has no effect upon cotton, or rather, the gun-cotton does not retain the sulphuric acid. We will endeavour to show the degree of importance to be attached to this fact.

If, in ordinary sulphuric acid mixed with half its volume of water, and cooled, be immersed cotton in successive portions, which are each time of immersion left therein for a longer period, then, if after washing these scraps of cotton, they are transformed into gun-cotton, considerable variations will be observed amongst them. Thus, if the cotton be left in the sulphuric acid but a few seconds, the gun-cotton will yield, by the evaporation of its ethereo-alcoholic solution upon glass, a coating of extraordinary tenacity, which cannot be removed by a very strong current of water. The subsequent specimen obtained by a longer immersion in the sulphuric acid will produce a gun-cotton whose ethereo-alcoholic solution will be much more fluid, and will more easily spread upon the glass, but which, on the other hand, can also be more easily removed.

Finally, (and this is a very singular fact) there is another variety of gun-cotton, which, having been submitted for a long time to the action of sulphuric acid, when dissolved in alcoholised ether, causes the liquid, by the addition of an iodide, to become intensely red.

The reader will perceive the extreme importance of these observations, when he knows that pyroxyline is the principal substance used in photography, and that it is obtained by the mixture of sulphuric and nitric acids. But it will be seen what care must be taken in order every time to prepare an uniform product.

* Continued from vol. iii. p. 86.

THE POSITIVE COLLODION PROCESS.

The negative processes are generally founded on the principle of deep impregnations, *id est*, the sensitive film is very thick, contains a large proportion of iodide and bromide, is sensitised with a concentrated silver bath, often containing some very easily reducible salts of silver, or a reducing agent that gives rise to them; also in those processes, the sitting must be a little lengthened, and the developer united to an excess of nitrate of silver, in order that the amount of reduced silver which forms the negative impression may be deposited in a deeper and more opaque layer, and that the proof may acquire a great intensity. In the direct positive process on collodion, the opposite principle must be followed; that of thin preparation, less iodised and sensitised, with a relatively weak silver bath, and one which, far from containing an accelerator, contains, on the contrary, an acid exercising a retarding action and preventing the formation of silver salts, more easily reducible than the nitrate. In fact, the picture being formed by reduced silver deposited in fine powder of different thickness, it is easy to conceive that if the developer is united to a small quantity of nitrate of silver, and finds a thin film of iodo-bromide of silver, acidulated by nitric acid, its action will be limited* in the parts impressed by the high lights, and will permit the parts less impressed to develop without the first ones being solarised, and will, therefore, give but a very weak proof, even if the sitting has been lengthened.

The principal difficulties of the positive process are in the development and the time of exposure, which ought to be as precise as for a daguerreotype proof.

The development cannot be pushed until the sulphate of protoxide of iron ceases to act any more on the impression, as this would always give rise to very grey whites, and more or less of a superficial veil, like that under which every negative is concealed when it is developed with sulphate of iron and viewed by reflection—it must be stopped long before its reduction be exhausted; thus the exposure must be a little more prolonged than is usually thought necessary.

Over-exposure, like over-development, gives solarised proofs too strongly marked in every part. By excess of exposure, the whites (provided the developing has been well conducted) are always *white*, and the *proof remains limpid and clear;* whilst a proof too much developed always loses the brightness of its whites, and *is more or less overcast with a superficial reduction that gives it a veiled appearance.* Too short an exposure, as well as insufficient developing, gives proofs of great contrast of lights and shades, and want of details in the black and coloured parts of the picture. However, it is very easy to distinguish between the want of developing and that of exposure; for the latter will never give harmonious proofs by any management of the development. The brightest whites and the purest blacks are always obtained by the shortest possible exposure to bring out the details in the blacks with a development of fifteen or twenty seconds—in about half the time that the developer should act.

The exposure varies, for a likeness taken under a skylight, from two to ten seconds; in full sunshine it is instantaneous. The picture should be developed by watching its appearance, not by transparency, but by reflection. As soon as the high lights are well out and the details of the blacks begin to appear, stop the developing by a thorough washing.

* The reducing action of the sulphate of protoxide of iron is limited by the amount of nitrate of silver free on the film: as soon as the nitrate is reduced, the sulphate ceases to act.

The materials are prepared according to the following formulæ:—

COLLODION.

Sulphuric ether, sp. gr. 0.720 ...	6 drachms.
Alcohol, sp. gr. 0.809	4 ,,
Tincture of iodine	1 drop.
Iodide of potassium	4 grains.
Bromide of cadmium	2 ,,
Pyroxyline	6 ,,

SILVER BATH.

Water	1 ounce.
Nitrate of silver	35 grains.
Tincture of iodine	1 drop.

DEVELOPER.

Water	1 ounce.
Sulphate of protoxide of iron ...	30 grains.
Acetic acid	45 minims.

FIXING.

Water	1 ounce.
Cyanide of potassium	17 grains.

BLACK VARNISH.

Spirits of turpentine	1 ounce.
Asphaltum	90 grains.
Yellow wax	15 ,,
Lamp black	15 ,,

Collodion.—Silver Bath.—When the collodion is not enough iodised, or the silver bath too concentrated, the proof generally wants harmony, the whites are very fine, but the blacks are without any gradation or details. With an over-iodised collodion, or a weak silver solution, the iodide of silver being imperfectly formed, the preparations are not very sensitive, and the positive is unequally developed. It may even occur that the iodide of silver instead of being in the body of the film, is entirely upon its surface, and easily taken away by a gentle rubbing.

A too acid silver bath renders the preparation less sensitive and gives a film, which comes off and tears when in the bath, or during the developing, fixing and washing.

The film, sensitised with a neutral bath, is very sensitive, but easily solarised or veiled—the proof having great want of harmony.

The silver bath is gradually rendered acid when used with collodion, prepared with cadmium. It may be neutralised with newly prepared oxide of silver.

Old silver baths give rise to grey proofs, without vigour and brightness; that effect is owing to excess of nitrates of the bases of the iodide and bromide in the collodion, which prevent an equal developing, and to the organic matter. When a bath is old, and out of order, it is better not to try to remedy it, but to make a new one; for it will never work well again.

Sulphate of Protoxide of Iron.—The action of the sulphate of iron is exceedingly great on the beauty of the tone; it is often thought that the causes of failure are in the collodion or silver bath, when they entirely exist in the developer. Pure sulphate of protoxide of iron must be employed, and it is a good plan to dissolve it some time in advance in order to let the sulphate of peroxide settle, the action of which is very prejudicial.

The developing solution must be prepared every day—an old developer gives, when it is very coloured, too vigorous proofs, and metallic whites.

Acetic Acid.—The impurities that this acid generally contains are sulphuric acid, and acetate of soda, both of which exercise a hurtful action on the direct positives; the sulphuric acid gives metallic and cool tones. The presence of acetate of soda hastens the developing and gives rise to proofs more or less contrasted, often veiled, and with grey whites; hydrochloric acid is the most to be feared, as it deprives the impressed film of a part of the nitrate of silver, which is necessary to develop the latent impression; and thus gives proofs unequally developed, and having a dull and blackish appearance. For the same reason the water employed to make the solution must be free from any salt capable of precipitating silver.

The asphaltum varnish ought to be applied on the proof only after having varnished it with a thin solution of copal in alcohol, or in benzol.

If the proof is to be coloured, it may be covered with a layer of gelatine, upon which the wet or dry colours are applied; the black varnish is then spread on the back of the glass. D. C. P.

Critical Notices.

Photographs from the Philippine Islands. London: Negretti and Zambra, Hatton Garden.

The time seems rapidly approaching when, without stirring from our own firesides, we may be able to see the most distant corners of the world in miniature in the stereoscope. In proportion as the appearance of the camera became more common in Egypt and the Holy Land, the more adventurous photographers turned their steps to more distant and less known countries. Even the jealously-guarded countries of China and Japan cannot shut out the camera; and the pictures we have received of Chinese people, costumes, and buildings, will, before long, be followed by others of Japan. It even appears that at least one photographic firm has thought it a safe speculation to send its own special photographer on a roving commission to the East in search of novelties; and it is to the enterprise of this firm that we owe the beautiful transparent glass positives of which we propose to give some account, not merely because of their superior qualities as stereograms, but also on account of the singular scenes they depict, and as being illustrative of the risks photographers are willing to incur in their desire to obtain pictures of rare or unique character.

The photographer, a portion of whose works we have before us, left Canton, according to his instructions, and proceeded to the Philippine Islands, which, for the benefit of those photographers who may have forgotten a portion of their geographical lore, we may mention, are a group of islands in the Asiatic archipelago, belonging to Spain, the chief of which is Manilla. These islands are of volcanic origin, and possess a chain of active volcanoes, and among them is one named the "Taal Volcano," situated at no great distance from the city of Manilla. This volcano stands in the middle of a lake, and, to reach it, it was necessary to have a canoe; and in this somewhat doubtful craft the photographer embarked, with his tent, camera, and other etceteras, at midnight, with the object of reaching the volcano early in the day, as its size is considerable, probably not much less than half a league, and it was likely to occupy several hours in exploring and photographing it. His primary object was to get a negative of the crater; accordingly, with the assistance of the guides, he pitched his tent on a suitable spot, but the heat was so great, and the steam, which rose through the fissures, so dense, that, to escape suffocation, he was obliged to give up the attempt there, and seek another spot where these inconveniences did not exist to so great an extent. The first four plates he exposed were failures from over-exposure, in fact, were quite black, though plates exposed on the mainland on the previous day for the same periods—thirty and forty seconds—were exactly what they ought to be, chemicals and all other substances being apparently identical. His next attempts were guided by this discovery of the difference in the atmospheric conditions, and the negatives from which the pictures before us were printed were taken in four seconds, the acceleration being, as he seems to suppose, in some measure due to the presence of sulphurous vapour in the atmosphere; a rather singular circumstance, as it would be imagined that this would retard rather than hasten the activity of the chemical rays, or, at all events, would exercise such an influence on the chemicals employed as would prevent the proper productions of the picture. It is not a little remarkable that in the portion of our Japanese correspondent's journal which we print to-day, he makes the remark that there was a strong sulphurous smell on one occasion when he took some views of the crater of a volcano, though he does not seem to have had any idea that it would affect his pictures in any way. Apparently, however, there is no comparison as regards magnitude between the hill of which he speaks and the Taal volcano, nor does it seem that he was affected by the sulphurous

vapours to anything like the same degree as the gentleman whose pictures we are now considering, who found them so strong that even his guides made an irruption into his tent, in the hope of escaping from their unpleasantness. The presence of sulphur in considerable abundance in the water may be inferred from what he says of the appearance of the land on the margin of the waters of the lake which surround the volcano, as well as of that which surrounds the waters contained in the craters themselves, which, he says, present a greenish white appearance, from a substance caked like ice on the edge of a pond. This probably arises from the evaporation of the water, leaving a portion of the surface which it covers, at, and for some time after, the rainy season, bare; the sulphur it holds in solution being deposited on the source which forms its bed. An attempt was made by him to obtain a bottle of this water from the basin of the inner crater, as well as to make a closer examination of it; but he had become so weakened by perspiration, from the intense heat to which he had been subjected since landing on the volcano, that he was unable to make the exertion. However, that Mr. Negretti's scientific friends might have an opportunity of analysing it, one of the guides was lowered, by means of a rope, and was hauled up again, bringing a gourdfull of the water with him, the temperature of which was found to be 110°.

All the trouble and even risk, which the photographer encountered in this expedition to the Taal volcano, was undergone for three negatives, of which he could not even take duplicates, owing to the bath getting covered with a black pellicle, which adhered to the collodion film on the plate being lowered into it. Fortunately, the quality of these negatives, combined with the remarkable scenes they depict, must have made him feel that his exertions had been amply rewarded. The positives which have been printed from them have all the sharpness and definition which are characteristic of well-printed glass positives. The different strata are shown with the distinctness which is observable in M. Gutch's best geological photographs, and every channel which the heavy rains have worn in the walls of the craters are faithfully reproduced. That which we will term No. 1, gives a view of a portion of the volcano between the walls of the inner and outer crater, somewhat in the shape of the moat which surrounds the remains of the castle of Old Sarum, only the inner wall is very considerably higher. No. 2 gives a view of the lesser crater, the sides of which rise to a great height, and are seamed with channels worn therein by the ruins. In this, also, every detail of the stratification is depicted with the most beautiful minuteness. A small lake occupies a portion of the picture, the waters of which are covered with a white vapour-like steam, its borders being surrounded with the greenish-white sulphurous substance, of which we have already spoken. No 3 is, however, the picture which is not only the most beautiful, but the most interesting. It includes a more extensive area than either of the others, and near the centre rises the crater from which the smoke is issuing in a dense volume, which sufficiently explains the presence of the sulphurous vapour in the atmosphere.

We omitted to state that these pictures are for the stereoscope, and, taking all the circumstances into consideration, we are decidedly of opinion that they are the most interesting ever submitted to our judgment; and we trust that, for the sake of the enterprising publishers, they will meet with the extensive sale which they merit.

Stereograms of the Birth-place, &c., of John Wesley.
J. S. Overton, Crowle.

The re-publication of a Life of Wesley, the celebrated founder of the sect which have adopted his name, as well as the interest which attaches to all men who exert a powerful influence over their fellow-creatures, naturally suggests the idea that many will be glad to know that stereoscopic views of his birth-place and the church in which he was baptised, have just been published. Whether he ever officiated in the church we are not aware, but we should think not, as, at the time he was ordained, his father held the living of Wroote, also in Lincolnshire. It is of this John Wesley that it is said, he rode from forty to sixty miles a-day, reading and writing as he went, and never preached less than three, and often as many as six, times a day! The pictures are very good, and were printed and toned by the process described at vol. i. page 86, of this journal, which leaves nothing to be desired on that score. As this process is a comparatively cheap one, we would recommend it to the attention of our readers.

Dictionary of Photography.

Glycyrrhizine.—Glycyrrhizine is an organic compound, half resin, half sugar, but not susceptible of fermentation. It has a great tendency to enter into combination with bases, and unites with the alkalies and earths forming compounds soluble in water. It may be prepared as follows:—Make a concentrated decoction of liquorice root, strain the solution from the woody fibre, and then add dilute hydrochloric acid until no more precipitate falls. Filter and wash the precipitate on the filter with a little cold water until the filtrate is free from any acid reaction; then dissolve the precipitate (which is impure glycyrrhizine) in alcohol, and evaporate to dryness at a gentle heat; the glycyrrhizine will be left behind in the form of a brilliant transparent brownish mass. It is sparingly soluble in cold water, especially if acidulated, more so in hot water, and very soluble in alcohol; it has a sweetish taste, and leaves a disagreeable bitterness in the mouth. It was first employed in photography by Mr. Hardwich. For an account of the value of glycyrrhizine in photography, see the article on "Accelerating Agents" in vol. i. p. 43.

Gold.—This metal is of constant use in photography for the purpose of toning paper prints. It is employed either in the form of perchloride of gold, or as *sel d'or*, which is the technical name for the double hyposulphite of gold and soda. Gold salts are easily decomposed, with reduction of the gold to the metallic state, by the action of heat or light.

Gutta Percha.—A gum obtained from the tree *Isonandra Gutta*, a native of Borneo and Singapore. It has a great resemblance to caoutchouc in its chemical qualities, but differs somewhat from it physically. It has only a limited elasticity, and, by immersion in hot water, can be softened sufficiently to enable it to be moulded into any desired form: upon cooling, it regains its previous consistency. It is affected by few chemical reagents in the cold; acids and solution of chlorine being, under these circumstances, without action on it: essential oils, coal tar, naphtha, and bisulphide of carbon, are, however, capable of readily dissolving it. Gutta percha gradually deteriorates in time, even if kept away from moisture, becoming brittle and easily reduced to powder. Gutta percha is of great value in chemical and photographic manipulations, being used as a substitute for the more friable glass and porcelain baths, dishes, and funnels.

Head-rest.—An instrument for the support of the sitter's head during the operation of exposure. There are several kinds in use. One is a *chair-back rest*, which is very portable, and, as its name implies, can be tightly clamped to the back of a chair. Another kind, the independent iron head-rest, consists of an upright bar supported on a heavy iron foot, and having the arms which are to touch the head movable up and down the upright rod, and adjustable by a screw.

Heliography.—The name given by Nièpce to his first photographic process. It is a more correct term than that of *photography*, afterwards adopted by general consent, as the latter term signifies drawing by means of *light*, whilst the former term merely signifies drawing by means of solar radiation.

Honey.—This well-known substance consists of an indefinite mixture of two kinds of sugar, possessing different properties; one kind (*grape sugar*) constitutes the solid crystallisable part, and is the sugar in which the reducing power of honey upon silver salts resides; the other is uncrystallisable, being similar to treacle. Pure grape sugar can easily be obtained from honey, by shaking up with twice its bulk of alcohol and filtering; the grape sugar will be left undis-

solved, whilst the treacle will pass through the filter with the alcohol. Honey is frequently adulterated with starch or flour.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS—GLASS NEGATIVES.—(*continued*).

If the collodion is very dark coloured it may be difficult to obtain sufficient intensity; therefore, it is better to employ a newer collodion until the operator is well acquainted with the peculiarities of this important but capricious substance.

The student will do well to peruse the articles headed "Photographic Failures" in recent numbers of this journal, at the present time, as defects may exhibit themselves which he should have it in his power to remedy at once. There are, however, *ordinary* defects and peculiarities which are mostly known only to beginners, and which, for his guidance, I will proceed to notice; and if any negative which the student may have obtained is free from the defects common with inexperienced manipulators, then he should carefully take several others under exactly similar circumstances, so that he may not lose sight of the successful path which he has traversed. It is very important, when obtaining one good result, to try another plate in the same way, in order to prove that the cause of success is not so much the result of accident as it is the reward of skill.

When a good negative is secured, it may be varnished with negative varnish—the French being the best: this should be applied by gently warming the plate before and afterwards, otherwise the varnish in cooling will be opaque instead of transparent. Negatives should not be varnished near an open door or window, as a sudden breath of air will chill the varnish, and produce unequalness, which will affect the print to be taken from it.

Among the defects which commonly present themselves to the beginner, the following may be considered deserving especial notice:—

Opaque spots, which are most easily distinguished when looking *through* the glass.—These are commonly caused by slamming the shutter of the plate-carrier, which causes small particles of dust to attach themselves to the film; this, however, is not so likely to occur when the plate-holder is new. It not unfrequently occurs that the collodion, from some circumstance or other, will cause these opaque spots to appear, and this must be remedied, either by allowing the collodion to settle for a few days, or by filtering it. Again, if the bath has been imperfectly filtered, it will sometimes cause these spots to show themselves. Opaque spots show, by their blackness and intensity, that there has been an excess of development at each spot, unless it is merely caused by a solid substance falling upon the film, which is easily ascertained. When the collodion is at fault, the operator will observe minute crystals form upon the plate as the ether evaporates; and each of these minute crystals will produce an opaque spot with a transparent radius. The collodion should be allowed to settle for a few days.

Transparent spots are generally due *to something* which falls upon the plate, and prevents the action of light at that part; consequently, when the developing agent is poured on, no action takes place where the particle rested, and it finally becomes washed off. These transparent spots may arise from several causes. The bath, having particles floating about in it, such as small fragments of collodion film, will commonly be the source of evil; in which case refiltering, or allowing it to settle, is the only remedy. If the interior of the camera is dusty when the slide is removed, myriads of small particles are wafted about, which finally settle upon the plate, and, of course, prevent the action of light.

Transparent spots, but of a different character, will be caused by leaving the plate too long in the bath, or allowing too long a period to elapse before exposure in the camera. In either case, the nitrate of silver re-dissolves the delicate coating of iodide of silver formed, and the plate appears as if the iodide were eaten into holes—as, in fact, it is.

Comets, as they are appropriately called, are perhaps the most common defects which the photographer meets with. The "comet" is, like its ærial namesake, a thing having a nucleus and a tail; and it not unfrequently occurs that several of these will be found upon the plate at one time—sometimes hundreds, when the collodion is new, or the bath contains much sediment. The comet may be traced to something which settles upon the plate; and as the solution flows downwards, an unequal action takes place where the film has been protected by the particle attached to it. This is clearly proved by draining the plate through placing it upon one of its corners, after removing from the bath, in which case the comets, instead of occurring vertically, will proceed in an oblique direction. There is generally a solid opaque nucleus to be observed in the centre of each comet, which is probably either due to the collodion or the bath. Filtration or decantation, in either case, must be adopted to remedy the evil.

Sometimes spots in the form of a horseshoe will occur on a plate. These are owing to the plate having been removed from the bath too soon. It should not be lifted out of the bath within fifteen seconds.

Horizontal lines will occur when the plate has been lowered into the bath with an unequal jerking motion. It should always be immersed promptly and not with a jerk.

Curved lines are generally owing to an irregularity in the process of development: either the agent has not been poured on all over at once, or, the weather being warm, a little more acetic acid is required in the developer. These peculiarities will also show themselves when too much pyrogallic acid has been used.

Zigzag lines will most frequently arise from the glasses having been imperfectly clean; but they will also result from using a collodion which has been prepared with bad materials. When the defect is clearly traceable to the collodion, it may be cast aside as useless, or, at all events, it must not be used for some time, and then it should be mixed with some other collodion a day or two before using.

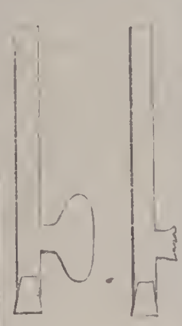
Streaks and defects of a similar character are mostly due to the want of cleanness in the glasses. Occasionally, after breathing upon a glass to see if it be clean, a small particle of saliva is ejected from the mouth, and if the cloth or leather be again employed to rub the glass, it is probable that a smear will be formed, extending, perhaps, for nearly an inch or even more in length, and at this part of the plate there will be less chemical action, consequently, it will present a transparent appearance, which will destroy the picture, unless it occurs in the sky or any part which may be painted out.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Piercing holes in glass by heat will require the aid of the blowpipe, which we will assume the amateur has now learned to use. A mark being made on the tube or bottle at the point where the hole is required, a pointed flame is to be directed at the spot by means of the blowpipe, until the place is red hot. If a tube is under operation, one end must be stopped with a cork, and, when the part to be pierced is sufficiently heated, the lips are to be applied to the open end, and air blown into the tube; the heated spot will at once rise into a bubble, and finally burst, leaving a flange, to which, if necessary, another tube may, by means of heat, be attached. The woodcuts show the form of the tube, as it is first blown into a bubble and then into an aperture.



To join another tube to the aperture requires a little care and skill. The edges of the aperture and the end of the tube to be joined must both be heated red hot, and, as both must be heated together, the blowpipe cannot conveniently be used; they must be heated at the top of the flame, taking care to avoid the slightest blackening or deposit of soot; when both are quite red hot, the two edges should be pressed together, firmly but lightly. The flame may then be directed all round the joint, and if necessary, the projecting tube stopped, and air very carefully blown into the other whilst the joint is hot, so as to adjust its shape; it must then be carefully and slowly cooled.

Another method of piercing glass by means of heat, is to direct a pointed flame on the intended aperture, by means of the blowpipe, and, when the glass is heated almost to the melting point, press a piece of glass rod—the end of which must also have been heated, or it will crack the tube, instead of becoming attached to it—on the spot, and then draw it quickly away. A portion of the tube will be withdrawn with it, producing a small projecting tube from the side of the larger one.

Bulbs or globes in glass tubes, such as are required in pipettes, &c., may easily be formed. One end of the tube must be closed, and the heat directed on the required spot. Unless the tube be a stout one, before any attempt is made to blow a globe the tube should be thickened by pressing the two ends together whilst thoroughly heated, at the part subsequently to be expanded. This done, it is to be heated again, and air steadily introduced into it from the mouth. The tube should be rotated, both whilst being heated and whilst the operator is blowing; unless this be done, an expansion of irregular shape, instead of a globe, will be produced. The amateur must steadily watch his work, and see that the glass is assuming the proper shape and size. If a malformed bulb is produced, it will be necessary to throw it aside and begin again; but if the globe be perfect in shape, but not sufficiently large, it may be again heated and further expanded; this must be done with judgment, however, otherwise, as the globe enlarges and of course becomes gradually thinner, the amateur may be disappointed by the bubble suddenly bursting, just as he had fondly imagined a perfect globe of the right size was obtained.

Small tubes may be joined to larger ones, by heating and drawing out the latter until sufficiently attenuated, and the end possesses the same diameter as the tube to be joined. The two ends are then heated sufficiently and pressed together, when they will join. The thickened joint may, by a few times heating and blowing into, be reduced to the proper size of the tube. Where a large bulb or globe is required in a small tube, it is sometimes desirable to join on a larger piece of tube for the purpose; the latter can then be heated, and a much larger globe be blown, than could otherwise have been obtained.

In all experiments with glass in which heating is necessary, the precaution should be taken to heat and cool it slowly. Introduce the tube or rod to the flame gently and cautiously, or it will, especially if thick, crack, from the sudden expansion. The same precaution, even in a stronger degree, is necessary as to the cooling. The glass should be held in the hand, near the heat, or if available, placed in a sand-bath, to cool gradually, but on no account laid carelessly out of the hand, or brought into contact with anything cold, which would inevitably crack and render useless that which the operator had perhaps just congratulated himself upon, as the successful completion of a piece of delicate and difficult manipulation.

(*To be continued.*)

Photographic Chemistry.

HYDROGEN—(*continued*).

THE hydrogen thus obtained will be found to have a disagreeable odour; this arises from the presence of foreign matters in the gas, from which it may be freed by being passed through solutions of nitrate of silver and potassa; in a pure state it is quite inodorous. Soap bubbles filled with this gas rise with rapidity, as will readily be seen by thrusting the end of a short pipe into the neck of the bladder containing the hydrogen, the communication between the gas and the air being cut off by a string drawn tightly round the neck of the bladder below the stem of the pipe; dip the bowl into soap and water, loosen the string round the neck of the bladder and press it gently; the gas will inflate a bubble, which will detach itself from the pipe and float away. The approach of a lighted taper will cause it to take fire. Hydrogen burns with a dull flame, but evolves intense heat; the product of the combustion is water, as will be seen on holding a piece of cold metal over the flame, the vapour condensing on its surface. Let the gas, generated in the bottle in the manner just described, be allowed to pass off into the air until it has expelled the whole of the atmospheric air contained in the bottle, then apply a lighted match to the end of the bent tube, and the gas will take fire and burn as long as gas continues to be given off; this is termed the *philosophical candle*. Care must be taken not to apply the light until all the air has been expelled from the bottle, otherwise the flame will run along the tube, and the mixture of hydrogen and air in the bottle will explode with great violence. A mixture of hydrogen and oxygen is highly explosive, though it may be made to combine, under certain circumstances, without explosion; for example, by the suspension of a piece of perfectly clean platinum foil in the jar containing the mixed gases.

Various apparatus have been contrived to allow of this mixture being burnt together without danger of explosion, but they are very unsafe, and are not often employed, the common practice being to keep the gases in two separate gasometers and only allowing them to mix at the point of combustion. A very good apparatus for this purpose is a brass pipe, filled with rounds of wire gauze, into one end of which the tubes furnished with stop-cocks, and running from the two gasometers are soldered, the whole being so arranged that the gases transmitted to the orifice shall be in the proportions which shall produce the most intense flame. Into this pipe a blowpipe is screwed. The flame thus produced is of a peculiar character. It is not hollow as in the case of ordinary flames, but is, so to speak, solid, and yields a most intense heat. A slender steel file held in it will burn with beautiful scintillations, and platinum is melted with facility. If the flame be directed on a piece of lime, an intensely brilliant light is produced, which is known as the Drummond Light. The intensity of this light is such that it can be distinguished at night at very great distances, and, for various purposes, it is capable of being used as a substitute for the sun's rays.

Hydrogen, being itself a combustible, is incapable of sustaining combustion; to prove this, fill a wide-mouthed glass bottle with hydrogen, close the mouth with a piece of glass, keeping the bottle in an inverted position. Then take a wire, bent in the form of a long hook, to the point of which attach a bit of lighted wax candle; slide the mouth of the bottle off the piece of glass and pass the lighted taper rapidly up into the bottle, and the flame will be at once extinguished, although the hydrogen will be inflamed.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 31st October, 1859.

MM. Fordos and Gélis have published a note upon a peculiar decomposition, or abnormal coloration of paper. Many manufacturers have noticed that their paper, although perfectly white immediately after its production, takes a yellowish tint in the course of a short time, or shows, here and there, numerous round spots of a rusty colour. The authors above named have found that this colour is owing to the presence of iron, that its presence cannot be detected in the paste until the paper has passed through the drying cylinders, and that it is introduced into the paper in the following manner:—It is well known that chlorine or hypochlorite of lime is used to whiten the paste; after its action, the excess of chlorine is washed out, but, in most cases, this washing is not complete, and a certain amount of chlorine remains adhering to the paper. When the latter comes in contact with the iron machinery, a certain quantity of protochloride of iron is formed; this salt is colourless, but, in course of time, it absorbs oxygen, and passes to the state of perchloride or oxychloride of iron, producing the yellow tint and the rusty-coloured spots. The latter appear to be owing to a sort of crystallisation round some hard point as a centre. As it is very difficult to wash out all the free chlorine from the paper-paste, MM. Fordos and Gélis recommend the use of certain substances destined to neutralise this chlorine. To this effect they propose hyposulphite of soda, which has the advantage of neutralising a considerable quantity of chlorine. To detect the presence of free chlorine in the paper-pulp, the authors make use of a solution composed of 10 parts of starch, 10 parts of iodide of

potassium, and 10 parts of water. Some of the pulp is taken up in the hand and touched with this solution, which becomes blue in an instant, if chlorine be present. When this reagent shows that chlorine is present in the paper-pulp, this chlorine must be washed out as much as possible, and then a certain quantity of hyposulphite should be added, until the starch reagent indicates that all the chlorine has disappeared; the pulp is then washed again for the last time.

MM. Vogel and Reischauer have just published an interesting paper on the modification of transparency in certain glasses under the influence of heat. Certain glasses, and especially window glass, present some peculiar phenomena when they have been exposed some time to the action of the air. They undergo, in these circumstances, a sort of decomposition, which, however, cannot be detected by the eye, as the glass in question preserves its brilliancy and its transparency, but which becomes immediately evident if the glass be submitted to a slight elevation of temperature. Its surface is then seen covered with an infinite number of small fissures which spread over one another in all directions, giving rise to extremely small scales of a pearly aspect, and which may sometimes be detached with ease, leaving the under surface of the glass rough, and as if corroded.

M. Splitgerber having submitted this subject to investigation, found that the phenomena in question were only observed in glass having an imperfect composition, *i.e.*, in glass which contains too much alkali, and too little lime. Such glasses absorb water from the air and fix it chemically; in other terms, they become *hydrated* on their surfaces. They lose this water when their temperature is raised, producing the phenomena noticed above. M. Splitgerber has found a means of detecting glass of this description:—He lets fall upon the glass examined a drop of melted chloride of calcium; if the composition of the glass is good, no mark will be perceived where the drop falls, but if its composition be bad, this spot, when examined under a magnifying glass, will present numerous fissures, will have become quite opaline, and sometimes even rough to the touch.

MM. Vogel and Reischauer, in their paper alluded to above, have confirmed these observations of M. Splitgerber; and having analysed many varieties of glass, which present the phenomena of decomposition alluded to, they find that these phenomena occur only in glass which contains an excess of potash. The quantity of water contained in the little scales produced on the surface of such glass amounts to 10 or 12 per cent. In many cases this potash-glass can be *opalised*, by the mild heat of a water-bath. MM. Vogel and Reischauer have also shown that when plates of this glass remain for some time in certain saline solutions, such as nitrate of zinc, or nitrate of silver, they rapidly acquire the property of becoming scaly on the surface, by the application of heat. The latter phenomena are owing to a sort of double decomposition that takes place on the surface of the glass; an hydrated silicate is formed, which loses its water at a certain temperature, but whose presence does not alter the appearance of the glass at the ordinary temperature of the air.

These investigations tend to show why granite rocks, which contain *potash-feldspar*, are more easily decomposed by atmospheric influences than those granites in which soda-feldspar, or *albite*, is predominant.

A new process of preserving milk is being talked of in Paris. The means employed have been long known in England, unless I am very much mistaken. Some of this milk, which had been preserved for three months, was sent to me the other day for analysis. I found it composed as follows:—

Water	86·67	
Butter	3·96	13·33 per cent. solid substances.
Sugar of milk	4·00	
Salts...	0·50	
Casein, &c.	4·87	
	100·00	

It presented no peculiar taste or odour, so that both its aspect and its composition coincided with those of fresh milk from the cow. Whey, which had been preserved in the same manner, gave me also the following satisfactory composition:—

Water	95·00
Salts...	0·54
Sugar of milk, with a very slight quantity of albumin	4·46
	100·00

The process was not divulged by the person who passes here as the inventor; but from a slight deposit of caseous matter, which I observed at the bottom of each bottle of preserved milk, I am of opinion that the preservative process consists in placing the milk in a well-corked bottle, and plunging this bottle into boiling water for a quarter of an hour. If such be in reality the process in question, it is simple enough, and has been practised in England with astonishing success, though it is not generally known. I am assured that if the bottle be well-corked and sealing-waxed, milk that has stood for a quarter of an hour in boiling water will remain for a year or more as fresh as the day it was drawn from the cow.

M. Grabowski writes to an Odessa paper upon the mud of the lake of Golaïa-Pristane, which possesses extraordinary curative properties for cases of scrofula and the like, from the quantity of iodine and bromine it contains, and which has given it a reputation equal to the well-known muddy saliferous deposits of lake Sak, near Eupatoria, in the Crimea. The village of Golaïa-Pristane is situated on the banks of the Dnieper, in the district of Dnieper, under the government of Tauride. The salt lake in question is about half a verst from the village, and, until the year 1855, when a great inundation took place, large quantities of salt were extracted thence. An analysis of its muddy deposits, made by a medical man of Kherson, shows a notable quantity of iodine and bromine. I notice the fact, as it is always agreeable to hear of new deposits of rare substances, especially when the latter have been so usefully employed in the arts and in medicine as iodine and bromine.

A long paper was read lately at the Paris Academy of Sciences, by M. Gaudry, a young geologist, upon flint axes, and other arms or utensils manufactured by man, which he had himself dug out of the diluvium near the town of Amiens; thus following up the researches made in England by Mr. Prestwich and others. The natural conclusion to which one is drawn by finding these instruments side by side in the diluvium with the remains of extinct races of quadrupeds is, that *man appeared upon the globe at a much earlier period than is generally supposed.* The subject has been much investigated lately, and at the meeting of the *British Association* at Aberdeen this autumn, Sir Charles Lyell, president of the Geological Section, referred to this subject in the following terms:—"No subject has lately excited more curiosity and general interest among geologists and the public, than the question of the antiquity of the human race: whether or no we have sufficient evidence to prove the former co-existence of man with certain extinct mammalia in cases, or in the superficial deposits commonly called drift or *diluvium.*" I believe Professor Lyell and Mr. Prestwich have both visited the diluvium deposits in Picardy, from which M. Gaudry extracted the axes, &c., in question. M. Boucher de Perthes was the first, however, to make known the true geological position of these remains in the north of France, at Abbeville, in 1849. Those of Amiens, lately studied by Messrs. Prestwich and Gaudry, were described as early as 1855, by Dr. Rigollet. The stratified gravel in which these implements are buried, sometimes at a considerable depth from the surface, reposes upon the chalk, and belongs to the post-pliocene period, all the fresh water and land shells which accompany them being of existing species. "Athough the accompanying shells," says Professor Lyell, "are of living species, I believe the antiquity of the Abbeville and Amiens

flint-instruments to be great indeed, if compared to the times of history or tradition."

M. Becquerel has just presented to the French Academy the last of four memoirs on the temperature of plants compared to that of the atmosphere, observed with an electric thermometer. In the first three papers, M. Becquerel exposed the result of his researches on the *mean diurnal*, *monthly*, and *annual* temperature of the air and plants, which show that the mean annual temperature of trees and of the air are equal, and that the same may frequently be said of the monthly and diurnal temperatures. In his new memoir the author has limited himself more especially to the *diurnal variations* of temperature in the air and in plants. The diurnal variation in the air is the difference between the *maximum* and *minimum* temperatures of the day. Observations of this kind, made at Geneva, by MM. Pictet and Maurice, from the year 1796 to 1798, have led already to this remarkable fact, that the mean temperatures observed in a tree, from the rising to the setting of the sun, is equal to the temperature observed at two o'clock. Thus, during these three years of observations, the mean temperature, from sunrise to sunset, was 7°55, and the mean at two o'clock, 7°52; difference=0°03, which is insignificant. M. Becquerel has shown that the *minimum* of temperature in vegetables, whatever be their diameter, takes place about sunrise, and the *maximum* a few hours after sunrise.

The diurnal variation is about five times greater in the air than in a tree 0·6 mètres in diameter, and, on account of the bad conducting power of wood, this difference is so much the less as the diameter of the tree is less; in leaves it becomes *nil.*

M. Becquerel concludes from these results that the atmosphere is the source from which plants take the heat which is necessary for their growth. The heat which results from the internal elaboration which takes place in their tissues, does not sensibly affect the proper heat (*chaleur propre*) of the vegetable; this heat being entirely taken from the air. The mean temperature of the atmosphere, its variation and extremes of temperature, are, therefore, the only calorific elements we have to consider in relation to the phenomena of vegetable life.

These conclusions appear to me rather premature. If they were absolutely true, how should we be able to explain *the remarkable increase of temperature that takes place during the period of fecundation in many vegetables, more especially in the spadix of the Arum genus?*

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

As the news spread abroad of the wonderful work that had been accomplished, the crowd became every moment greater, and I began to think we should never get away; however, we did, at last, manage to get the tent and other apparatus packed up, and, at my suggestion, Dsetjuma fixed the plate on the edge of the balcony, so that all the world might view it in succession, and, cautioning them that they must on no account touch it, we left it there, and went in to breakfast.

If the affair had caused a sensation among the people in the garden, it had caused no less a sensation among the inhabitants of the village. What version of it had reached them I don't know, but I think it could have lost nothing in the telling, if I may judge from the half reverential, half frightened look with which they regarded Dsetjuma when we mounted our horses to leave. It was quite amusing, too, to see the manner in which they shrank back from the palanquin, while, at the same time, they endeavoured to get a peep into the interior, as if they thought it must be the abode of a demon, though, if there had happened to be one in there only one-half as ugly as some of those they represent on pictures, it must have had the same effect upon them, I should think, as a sight of the Medusa's head. We had travelled a considerable distance before we were left to ourselves, and, as soon as this happened, we left the high road and took a narrow path running in the direction of a hill of no great height, from which smoke was issuing. You will naturally suppose that it was as pleasant journeying along this bye-road as in your own country, but this was very far from being the case; instead of the fresh smell of the grass and wild flowers, of which there was no lack, the air was loaded with a scent which was neither agreeable nor, I believe, wholesome, but, on the other hand, it was tremendously strong, and in fact it bore the same relation to ordinary smells which ordinary darkness bears to the darkness which fell upon the land of Egypt in the days of Pharaoh; it was something which could be *felt.* This arose from the land having just received a dressing of a peculiar description, such as we very often met with in our wanderings afterwards, and which, so long as I remained in its vicinity, effectually prevented me from feeling an interest in the country.

When we left the high road we imagined that we were going to see a volcano, possibly in a state of eruption, and I felt considerable anxiety to get a picture of a natural phenomenon of this kind, as being a representation of an object which it is not given to everybody to see. Our progress was slow, for the road was very uneven, and Dsetjuma had an almost insane dread of his horse tumbling down and throwing him over his head, so that it was well on in the afternoon before we reached the foot of the hill; and as to going up it before we had refreshed ourselves, that was out of the question; besides, it would have been actual cruelty to the men who had been walking so many hours under the blazing sun; we therefore selected a thick tree, and threw ourselves down in its shade, while the bearers were getting out the eatables and placing them before us; and by the time this was arranged, we had each a bowl full of scalding hot tea brought to us, which is customary in almost every house in Japan: they think it gives them an appetite, and stimulates the stomach to a proper performance of its functions; but, though I am not qualified to pronounce authoritatively on the subject, my own opinion is decidedly opposed to this. It always seemed to me to cause an unpleasant sensation of having eaten too much before I had eaten anything at all, so that I failed to do justice to even the finest snails, however delicately they were dressed. By the time we were prepared to resume our upward journey the sun had reached a height which showed me that we had no time to lose, if we were to benefit by the labour we had undergone in coming so far; we therefore pushed on as rapidly as we could, and were not long in arriving at the top. I noticed several fissures in the sides of the hill as we were going up, but I attributed these to the heat of the sun, and thought them of no importance, never thinking there could be any connection between them and the interior of the mountain. The hill was certainly a volcano, but I was disgusted when I found what a contemptible affair it appeared when seen close at hand. The top of the hill was nearly flat, and sloped down very abruptly for five or six yards from its edge on almost every side. The crater, which was simply a ragged hole, about three yards in diameter, vomited smoke, together with suffocating sulphurous vapours, in a very sluggish manner, the interior being so densely filled as to prevent our seeing more than a few feet down.

As we had come so far, we determined on not going back without having taken a negative. The tent was drawn from its resting-place, and pitched in a suitable position. The tripod was fixed so as to bring the table as near the ground as possible; a plate was exposed in the camera for a suitable length of time, and developed, &c.; a second was taken from a rather lower elevation, which Dsetjuma found while I was developing the first plate, and which offered an opportunity of getting a better view of the crater; and a third and last was taken of a very singular-looking cone-shaped hill, about three hundred yards distant. We were

* Continued from vol. iii. p. 93.

quite two hours in accomplishing this, and when it was done, we rode across to some cottages a mile or so further on, leaving our men and traps to await our return on the hill. It turned out that some persons lived in this little village whom Dsetjuma knew, and he was so deeply interested in communicating with them that he let the time go by without heed, in spite of my occasional suggestions, so that it was quite dusk when he at last became conscious that it was necessary to decide on something; and this did not necessitate much hesitation, since it mattered very little, or not at all, whether we stayed at one place or another; it was therefore arranged that we should go to the hill and bring the apparatus down to the village, from whence we could make our way back to the main road on the following morning, by a different way to that by which we had come.

As the distance was not great, and the evening was very fine, two of the ladies and an old hunchbacked Japanese agreed to go with us, and though, so far as talking was concerned, my company could not have been very entertaining, we managed to communicate somehow, so that our walk there was a very pleasant one; so much so, indeed, that I had never looked at the point towards which we were shaping our course until my attention was directed to it by Dsetjuma; and then indeed I saw a sight which for singularity surpassed anything I had ever seen.

(*To be continued.*)

THE FOTHERGILL PROCESS.

To the Editor of the "PHOTOGRAPHIC NEWS."

SIR,—Your correspondent, who signs himself "Four Drachms," could not help "smiling" when he read my "decided and dictatorial" communication in the previous number of the "NEWS." I hope he will not be angry with me for indulging in the same pleasure when reading his triumphant reply.

"Four Drachms," with admirable consistency, has pointed out my error, and the cause of my failure.

Being a photographer of only *six years'* standing, I do not know, as yet, how long to expose my plates, neither can I draw the fine distinction between a plate that has been over-exposed and one spoiled by imperfect washing. These mysteries I have yet to fathom; and the many hundreds of plates I have prepared and exposed have contributed nothing to my practical knowledge.

I had been thinking I might calculate, with tolerable certainty, on my photographic experience, therefore I may well sigh, now I find out how grievously I have been mistaken. The only consolation I have, under these circumstances, is the thought that I have such an admirable instructor in "Four Drachms," and that, relying on the oracle of this greater "magnate," I shall not be likely to err again.

He speaks, and his very name is a guarantee of success:— "Wash your plates in 'four drachms' of water, be careful not to do it 'hurriedly,' and expose them next June, 4½ to 5 minutes, when the dense *green* foliage of that luxuriant month will appear with wonderful distinctness and detail."

I might stop here, were it not that such wisdom might not be fully understood without further elucidation. It is a pity to break the pleasing delusion, but I am compelled to say that I neither prepared my plates "hurriedly" nor exposed them too much, and that I *do* know (I will not say so well as himself, who does?) what an over-exposed plate is. I have had too much experience not to know that anything done hurriedly in photography had better have been left undone, and it is not very likely, when I am preparing a quantity of plates for my longest and most important annual excursion, that I should *then* do it hurriedly, and, as a natural consequence, imperfectly. Indeed, so far from this being the case, in the instance referred to, I was so careful that each plate, even in that "partial" manner, occupied me 15 minutes in preparation; and, for the sake of avoiding confusion, I never had two plates going at the same time.

But I have "over-exposed" my plates—there is the grand secret of "redness."

I promise my antagonist he must look well to his position. I will grant his request by extracting a few items of exposure from my memoranda:—"Plate No. 6, 'Kenilworth Castle,' bright sun, exposed 7 minutes." "No. 9, 'Warwick Castle,' with dense foliage in foreground, sun, 12 minutes." "No. 33, 'Grand Entrance, Raglan Castle' (light stone building, covered in some parts with ivy), bright sun, 5 minutes." "No. 36, 'Courtyard, Raglan Castle,' sun, 5 minutes." "No. 39, 'Tintern Abbey,' foliage in foreground, sun, 8 minutes." Results—No. 6, good; No. 9, excellent; Nos. 33 and 36, red and spoiled; No. 39, excellent. According to "Four Drachms'" theory, the only good negatives I ought to have had out of these five plates would be Nos. 33 and 36, which received his favourite exposure of five minutes, but it most unfortunately happens that these were the only bad ones. But what becomes of his reasoning, when I tell him that a plate which I had left, and which had not been exposed at all, on pouring some developing mixture over it, *turned as red as any of the others*, and in precisely the same way? Perhaps the sun had some particular spite against that plate, and penetrated the sides of the dark box, or, perhaps, according to M. Niepce, he had concealed some of his beams in that dark recess, which he slyly let loose on that unfortunate plate. How else it could have been "over-exposed" I do not know.

But let us see whether these red plates fulfilled the conditions of one over-exposed. On developing an over-exposed plate, the picture rapidly appears, high lights, half tones, and shadows, almost simultaneously, and the development is soon completed. On holding it to the light, the details are all seen, but it wants vigour and contrast, and looks feebled and good for nothing. This holds good both for wet and dry plates. Now, these red plates of mine, so far from developing rapidly, and the details all coming out, refused to develop at all, the high lights *only* appearing, after a prolonged application of the developer. This occurred with plates which had received both 5 and 10 minutes' exposure. But the redness, (or, perhaps, muddiness would better express it,) exhibited itself almost immediately, and increased so long as the developer was allowed to remain. But why should I waste any more time in trying to prove what the merest tyro in a dry process can understand, who has ever developed an over-kept plate? I leave it for "Four Drachms" to say whether my error of judgment, or the system which his name represents, is at fault. If he is candid, and really so well "up" in the art, as to be able often to get seven good negatives out of ten! may I ask, *en passant*, what spoils the other three? Surely *he* does not "over-expose" them. I say, if he possesses these qualities, he must admit my conclusion to be correct, viz., that the large amount of free silver left in the film, had, during the three weeks of intensely hot weather, during which the plates were kept, decomposed, or in some way altered the properties of the sensitive surface. Hence, I contend that the only way to insure stainless plates, after two or three weeks' keeping in hot weather, is to free them from as much nitrate of silver as possible, as in the collodio-albumen process.

"Four Drachms" does not tell us how long he keeps his plates, which, in "seven cases out of ten," turn out successful. If only a day or two, his success need excite no marvel.

There is nothing like a practical application, so I would recommend this gentleman, next June, to prepare a number of plates, according to his method, and take a three weeks' or month's excursion, deferring the development till he returns home, and then publish his results, faithfully, in the "PHOTOGRAPHIC NEWS." I will then not hesitate to compare notes with him again. In the meantime, I would also recommend him to give more evidence of his practical photographic ability before he attempts to call in question conclusions which have been reached by untiring industry

and careful observation, and only published when their truth has been undeniably attested.

I have entered so fully into this subject, because it is one which vitally concerns the successful working of this most excellent process; and because so much quackery and humbug have been published, one would almost think purposely, to cumber and perplex its otherwise simple manipulation. If that numerous class of amateurs whose business allows but a brief relaxation, during the summer, for the practice of this beautiful art, and who do not particularly relish transporting a huge tent, or a "photographic barrow," with all its multitudinous contents, over mountains, hills, and plains, would only take the necessary and simple precaution of washing their plates *well* before they leave home, they need be under no apprehension that they will spoil before they return. But if they choose to hazard their success, by exposing to the effects of three weeks' hot weather, in June or July, plates heavily charged with free nitrate of silver, I, at least, shall not be to blame.

M. N. P. S.

Proceedings of Societies.

London Photographic Society.

The first meeting of this Society since the vacation was held on Tuesday last, the President, the Lord Chief Baron Pollock, in the chair.

The minutes of the last meeting having been read, the Secretary proceeded to read a letter from a subscriber, who withheld his name, on the subject of the Archer Fund. The purport of the letter was to urge on photographers the great claim which the family of the late Mr. Archer had on their generosity, and offering, on the part of the writer, to subscribe a sum of a guinea, or half a guinea, for each of the seven photographic establishments he possessed, for a certain number of years, provided two hundred other photographers would subscribe in a similar proportion; the object of the writer being to insure for the members of the family such an education and start in life as they might reasonably have expected, if their father had not abandoned his original profession to turn his attention to subjects from which photographers had derived such inestimable advantages.

The President, addressing the meeting, said that there was no paper to be read, and asked if any gentleman present had any remarks to offer on any subject which might originate a discussion.

For a long time it seemed as if no gentleman had anything to say on any topic of the kind suggested; but, eventually,

Mr. Fenton stepped forward, and said, that just previous to the close of the last meeting the question of lenses formed the subject of conversation. During the vacation he had been working with one of the orthoscopic lenses, as well as with the old form of lens, and in his hands he found that the latter was the best for landscape purposes. With the orthoscopic lens he was unable to focus near and comparatively distant objects with the same distinctness, and, on the whole, he considered the old form of lens the best for general purposes. He had heard something of a new lens, invented by Mr. Sutton; and, perhaps, if any gentleman present had been using it, he would favour them with some remarks thereupon. He had made the above observations in the hope of inducing a discussion.

[We have given, we believe, the substance of what Mr. Fenton said, but he spoke in so low a tone that it was extremely difficult to hear him.]

On Mr. Fenton resuming his seat another long silence ensued, which was at last broken by

Mr. Bedford, who said that he, too, had tried the orthoscopic lens, and had arrived at the same conclusion as Mr. Fenton. For landscape purposes he found that it failed to give the same distinctness, in respect to near and distant objects, unless a small stop was used; and in that case, the length of the exposure was greatly increased. He had found that, to obtain the same degree of sharpness as with a different form of lens, it was necessary to expose for six minutes; whereas, with the latter, he could obtain the desired result in three minutes. He thought the orthoscopic combination a good one for architectural subjects, but not for landscapes. As for Mr. Sutton's lens, he had not tried it, and therefore could not say anything on the subject.

On Mr. Bedford ceasing to speak, the same uncomfortable silence pervaded the meeting, and several members rose and left the room, with that elaborate attempt to do so without making a noise, with which people sometimes leave a church at the beginning of a sermon, and which affects the nerves of those who remain infinitely more than would be the case if the exit had been accompanied by the overthrow of half-a-dozen chairs. At last,

Mr. Shadbolt rose to offer some remarks on what had been said. He began by saying that it would be well, if those who offered observations on a particular form of lens, first made themselves acquainted with what that particular combination was intended to effect; they would then be in a position to offer an opinion as to its relative advantages and disadvantages as compared with others. Moreover, the lens ought to be used under the conditions most favourable for developing its capabilities. Neither of the gentlemen who had spoken had stated whether they used a camera with a swing back, which was absolutely essential to enable the operator to benefit by the peculiar construction of the orthoscopic lens. (He illustrated this by a diagram.) He thought a good deal of confusion existed in the minds of many people on the subject of focal distinctness. They seemed to think that inasmuch as the eye discerned near and distant objects, within a certain range, with the same distinctness, the lens ought also to take in objects in the same manner, but this idea was fallacious. The reason why the single eye accomplished this was, because the pencil of rays which entered it was so small; whereas, the diameter of the lens in question being the same as the distance from centre to centre of the two eyes, two distinct images were superposed, the one on the other; hence resulted indistinctness, and the consequent necessity for using a small stop when focussing for near and distant objects in the same picture.

Nobody appearing disposed to take exception to Mr. Shadbolt's statements, or to offer any observations on the subject,

The Secretary read a letter from M. Joubert on the subject of a new process of producing fac-similes of engravings, &c., which he did not describe, but which is, in all probability, identical, or nearly so, with one of the many methods of accomplishing this object already extant.

As it seemed hopeless to attempt to revive discussion on the subject of lenses, or to originate another on any other topic, the President announced that the meeting was adjourned until the 6th of December.

The attendance of members at this the first meeting of the association, since June last, was very small, probably not more than forty were present at the commencement of business, if that may be called business of which we have given a report above. On the other hand, we were told, by way of consolation, that at the next meeting no less than three papers would be read, one of which will be read by Mr. Ennel, the other two by members whose names are not yet divulged. We would just suggest to these gentlemen, that if their papers are of a very technical character, they will do well to furnish us with copies, so that they may be printed *in extenso*, if they appear to us of sufficient importance to render that advisable.

Miscellaneous.

Photographic Effects of Lightning.—The following authenticated instances of this singular phenomenon have been communicated to the Royal Society by Andrés Poey, director at the Observatory at Havana. Benjamin Franklin, in 1786, stated that, about twenty years previous, a man who was standing opposite a tree that had been just struck by a "thunderbolt," had on his breast an exact representation of that tree. In the *New York Journal of Commerce*, August 26th, 1853, it is related that "a little girl was standing at a window, before which was a young maple tree, after a brilliant flash of lightning, a complete image of the tree was found imprinted on her body." M. Raspail relates that, "in 1855, a boy having climbed a tree for the purpose of robbing a bird's nest, the tree was struck, and the boy thrown upon the ground;

on his breast the image of the tree, with the bird and nest on one of its branches, appeared very plainly." M. Olioli, a learned Italian, brought before the Scientific Congress at Naples the following four instances:—"1. In September, 1825, the foremast of a brigantine in the Bay of St. Arniro was struck by lightning, when a sailor sitting under the mast was struck dead, and on his back was found an impression of a horse-shoe, similar even in size to that fixed on the mast-head. 2. A sailor, standing in a similar position, was struck by lightning, and had on his left breast the impression of number '4.4,' with a dot between the two figures, just as they appeared at the extremity of one of the masts. 3. On the 9th of October, 1836, a young man was found struck by lightning; he had on a girdle, with some gold coins in it, which were imprinted on his skin in the order they were placed in the girdle; a series of circles, with one point of contact, being plainly visible. 4. In 1847, Mme. Morosa, an Italian lady of Lugano, was sitting near a window during a thunderstorm, and perceived the commotion, but felt no injury; but a flower, which happened to be in the path of the electric current, was perfectly reproduced on one of her legs, and there remained permanently." M. Poey himself witnessed the following instance in Cuba:—On July 24th, 1852, a poplar tree in a coffee plantation was struck by lightning, and on one of the large dry leaves was found an exact representation of some pine trees that lay 367 yards distant. M. Poey considers these lightning impressions to have been produced in the same manner as the electric images obtained by Moser, Riess, Rarster, Grove, Fox Talbot, and others, either by statical or dynamical electricity of different intensities. The fact that impressions are made through the garments is easily accounted for by their rough texture not preventing the lightning passing through them with the impression. To corroborate this view, M. Poey mentions an instance of lightning passing down a chimney into a trunk, in which was found an inch depth of soot, which must have passed through the wood itself.—*Curiosities of Science.*

Improved Solvents for Cellulose.—M. Schweitzer, to whom we owe the discovery of the solubility of cotton in oxide of cuprammonium, confirms the excellence of M. Peligot's recipe. It appears to be established now, that by passing the liquid ammonia of commerce, strengthened with a little sal-ammoniac (hydrochlorate of ammonia) over electrotyped copper, a re-agent is obtained which enjoys in the highest degree the property of rapidly dissolving cotton. It appears also that by employing ammonia of a density 0.945, and saturating it with subcarbonate of copper, obtained by the precipitation of sulphate of copper by means of carbonate of potash, an equally efficacious solvent is obtained.

Photographic Notes and Queries.

PORTABLE TENTS.

Sir,—In your excellent paper a great deal has been said about the dry processes. I have succeeded in nearly all of them, and with all good pictures can be produced with tolerable certainty. Nevertheless, by the best dry process yet published, a picture cannot be taken, *cæteris paribus*, in less than from three to six times the exposure of the wet collodion. This is a consideration. I have seen one of the most successful manipulators in Manchester expose 20 minutes for a white house, in a medium light, Taupenot's method, ⅝in. stop, plate 12 × 10. One-fifth the time would have sufficed for the wet process.

To remedy this, I have arranged an apparatus which answers remarkably well, and can be adapted to any sized plate. Cover an umbrella with black cotton velvet, so as to form, when open, a dome large enough to put the head and shoulders into and to tie round the body, rather lower than the waist. Cut out of this dome an oblong piece, ⅓ the distance from the top, about 6 inches long and 1 inch, or 1½ inches, broad. Fit into the opening a dark yellow piece of glass, placed in a frame for security. Light must not enter the bag, except by this window. From the top let there be a communication, by means of a flexible tube, between the outside and the operator's mouth, to insure a constant supply of fresh air; in the inside place pockets to hold the collodion bottle, &c. The bag must be made to tie round the waist by means of a cord, which the operator should do himself inside.

My chemicals I carry in a leather bag, like a boy's satchel. It is divided into compartments to suit the size of the bottles, baths, &c., and when filled for a day's work, including water, weighs only 5lbs. 4ozs.

We will now suppose a site for a picture has been chosen; open your tent, put your collodion bottle into one of the pockets, your dark slide ready, your bath hanging from the neck; get in, lay the handle of the umbrella against the body (it won't hurt, and rests nicely), tie the cord tightly round the body, and the coating and sensitising proceed comfortably.

When ready for the developing, I leave my satchel and its contents outside, get into the tent, take the plate from the dark slide and place it in my developing bath. This bath is something new, and is the most useful means of development for outside photography I ever worked with; it is made exactly as recommended by your correspondent "T. P., Bath" ("Photographic News," September 30th), except that I have a passage down the side of the bath, separated from the principal chamber by a thin slip of glass. It is varnished over with black varnish, except two opposite portions, which are left to watch the development through, and which are covered with two yellow glasses. Into this bath, when empty, I place my plate, cover the top, bring it into the open air, pour the developer down the narrow passage, and watch my picture through the windows, not allowing too much light, for fear of fogging. The plate is thus evenly developed and with little trouble. I wash and fix in the same bath, and in the open air. I may as well mention that my nitrate bath for stereoscopic plates holds 4ozs., and my developing bath takes, for each plate, 1oz. exactly. The weight of the whole apparatus, above the dry process, is nearly 8lbs. for plates 12 × 10, and a day's work.

The most important feature in this method is the ease of development, washing, &c., and, on the whole, takes less time, and is more satisfactory than any dry process at present known. C. B. G.

Manchester.

LUNAR PHOTOGRAPHY.

Sir,—In a paper on "Photographs of the Moon," read by Professor Phillips, at a meeting of the British Association, held at Hull, in the year 1853, I find the following statement:—

"Taking, in the case of Lord Rosse's telescope, a first image of 12 inches in diameter, which would bear magnifying eight times, it would be equivalent to one image of 96 inches in diameter. By such means we might have a record of the moon's physical aspect under every phase of illumination, and under every condition of libration, nearly as we should see her at a distance of 24 miles through the earth's atmosphere. We could then see, and measure on the glass or metal, her mountains or valleys, her coasts and cliffs, &c. . . . He (Professor Phillips) had, however, made certain experiments, which led him to the conclusion that it was within the great magnifying power of the Rossian reflector to show black, narrow spaces on the moon, not exceeding 10 feet in width."

Although I have been a subscriber to your excellent "News" from its commencement, I have seen no mention ever made of Lord Rosse's leviathan telescope having been used in lunar photography.

As I take great interest in this branch of the art, perhaps some of your talented correspondents, would give some account of the powers, &c., of the Rosse telescope, and state whether any attempts have been made to render it available for taking views of our satellite.

LL.B. Cantab.

A PHOTOGRAPHIC DIFFICULTY—AND HOW I GOT OVER IT.

Sir,—Wishing to obtain a photograph of the Norman doorway of Shebbear church, North Devon, I made many attempts, but they were all more or less failures. I tried with a half plate camera, a quarter plate camera, two or three different collodions, by separate makers, with full aperture to the lens, and then with stops, in bright sunshine and on a dull day, but all to no purpose—every plate was more or less foggy and indistinct (while at the same time, with the same apparatus and materials, I got good impressions of the church itself taken from a distance). The foggy results were the difficulty, and the way I got over it was by making a sketch of the same doorway, a very peculiar and interesting bit of "*Norman craft.*" I would therefore advise all who practise photography, to cultivate an acquaintance with the pencil, as they will find it a ready means of obtaining many interesting and valuable "bits," when the camera fails. The only way I can account for the failure is, from the doorway being situated in a low, white-washed porch, thereby sending reflected light into the mouth of the lens. Perhaps some who see this and have tried such subjects will be good enough to reply, and say if they have met with the same difficulty. I inclose a sketch of the doorway. J. F. G.

PHOTOGRAPHIC PATENTS.

Sir,—If you can find space in your "News" for the accompanying remarks, it may, perhaps, prevent some one falling foul of a patent, which is anything but agreeable.

Under the head of "Photographic Notes and Queries," in last week's "News," is an article by "Nemo," on "Binocular Vision and the Stereoscope," in which he refers to the mingling of colours in the stereoscope. In this there is nothing new, as, in November, 1856, I obtained a patent for colouring stereoscopic pictures in opposite or contrast colours, which patent directly afterwards became the property of a company, who have, since that time, published a variety of pictures adapted to this method of colouring, one of which I inclose; and I think you will be disposed to admit that the effect of the objects represented could not be so truthfully represented by any other method.

Your correspondent is in error when he says, that in the coalition of two forms of different colours, the resulting colour is what would be obtained by the mingling of two, viz., blue and yellow, producing green, &c. This is not the result. The colours do not mix, but are blended, as in shot silks, pearl, and opalescent substances, each colour, in turn, blending and preponderating over the other, according to the quantity of light, and direction in which it falls on the picture. R. Harmer.

10, *Union Street, Spitalfields.*

WATERMARKINGS IN THE FOTHERGILL PROCESS.

Sir,—Perhaps the following little experiment will give beginners a clue to the cause of these defects, and also to the means of preventing their occurrence:—Take an ounce measure, pour into it half an ounce of water, and on this, half an ounce of prepared albumen. On holding the measure between the eye and the light, numerous slender filaments of albumen will be seen diffused through the water, and their resemblance to the blemishes in question at once noticed; now stir with a glass rod, and observe that it takes some little time and care to bring about the complete mixture of the two fluids.

Hence, two precautions are suggested:—1st. When diluting the albumen, previous to pouring on a plate, be careful to mix the water and albumen together *thoroughly*. 2nd. When washing the surplus albumen off the plate (if this operation is done in a dish or trough), agitate the water well, in fact, *violently*, holding the dish in both hands and shaking it from side to side; change the water three times, draining off closely each time, that none may run back over the film. An Amateur.

THE REVERSED ACTION OF LIGHT.

Sir,—Permit me to notice, for the information of your correspondents who are at present investigating the reversed action of light, that the acetate of soda, in combination with gallic acid, possesses the property of producing that effect on collodion plates. The *modus operandi* is, first, to pour on the saturated gallic acid solution, and as soon as the very faint image which its application produces is discernible, pour off the developer into a capsule containing a few drops of the acetate of soda solution, 10 to 15 grains per ounce, and the image immediately appears reversed. I. B.

TO CORRESPONDENTS.

W. B. B.—It is very difficult to take a good positive on a preserved, or dry, collodion plate, as there is always a great tendency to fogging. As a rule, a negative taken at one operation is far better than one obtained by intensifying a positive. We have, however, seen some few exceptions to this. Your specimen of the results of the oxymel process is very good. As this process seems very little practised now, and you think that it is "the most certain, the most easily manipulated, and the most economical preservative process," would you mind obliging us with some details as to your formulæ and mode of manipulation, whereby others of our readers may be enabled to try a process which is capable of yielding as good results as those before us?

Bruin.—1 and 2. A twin lens camera mounted on Latimer Clark's principle, is, we think, the most useful, as it gives the power to take the pictures simultaneously at a small angle, or separately, at a greater angle, according to the wish of the operator, and the requirements of the particular scene. 3 Too much, unless the camera is provided with good lenses. 4. A large angle aplanatic view lens of 4½ inch focus. 5. We do not know the kind of camera named.

S. T. W.—You have completely ruined your bath. What were you thinking of to add pyrogallic acid to it? You can *try*, for the sake of experiment, the effect of exposing it to sunlight for some time in a white porcelain dish, and then filtering and acidulating, but we much fear it will be useless: in that case precipitate it with salt, and recover the silver from it, by any of the methods described in former numbers of the "Photographic News."

T. W. Willis.—1. The Government signal light, described in our first volume, will answer your purpose best. 2. All such compositions give off a great quantity of deleterious vapours when burnt, and will thus require a lantern with a chimney such as you describe. 3 and 4. Entirely matters of experiment. As a minimum quantity, try two ounces.

M.R.C.S., Bristol.—1. Four inches. 2. See answer to "Bruin." 3. We see no advantage in having the front of the camera arranged so as to enable the lenses to be separated laterally. If they are permanently fixed at four inches from centre to centre, the resulting pictures will be in the right position on a glass 6¾ inches long.

H. and J. Walter.—Many thanks for the prints. The negatives are good ones, although somewhat deficient in sharpness. "The Slate Quarry" is very well printed, but the "Bitter Cleave" is not at all nice. Cheap paper is the dearest in the end.

An Invalid.—Read A. Watt's articles on failures, given in recent numbers. The following may be some of the causes of your pictures being stainy:—Too long a use of the bath, alkaline condition of the bath, insufficient acid in developer.

Abner.—We have heard of glass rooms which have not cost more than £10, and have seen very good pictures which were taken in one, but we do not think it would be advisable to limit your expenditure to that sum, if you can afford more.

G. M. F.—Some photographic warehouse, or professional photographer, would be able to tell you far better than we can. We will send your letter to a friend, who may be able to do as you wish.

Iodine.—Gaseous hydrosulphuric acid has been used for the purpose of toning positive prints, which it does very well, changing the red to a rich brown colour; but prints so toned are almost certain to fade.

Antwerpia.—Both of the papers you mention are of very limited use, and give, according to our experience, inferior results.

T. F.—The specimen of fading is most remarkable; we will examine the print and return again to the subject in a future number.

T. M. Ravens.—The letter has been withdrawn, according to your wish. Shall we hear again from you on this subject?

W. W. will find the desired information in No. 53 of the "Photographic News," p. 5.

A. Z.—Fasten your calotype paper to the board with pins made of pure silver; you will then cease to have the stains radiating from the pinholes.

Porta.—Declined, with thanks. We do not think our readers would care about a poetical description of the *modus operandi* of the collodion processes.

B. L. D.—Place it in a bottle with some salt and nitric acid; shake it up well, and the chloride will be precipitated, leaving a clear supernatant liquid.

Folly.—We shall be glad to see the communication of which you speak. Its insertion must of course depend upon its intrinsic merits.

S.—Iodide of ammonium is used in the same proportion as iodide of potassium, namely, about 4 grains to the ounce.

C. W.—Received. Two letters.

J. P. G.—The prints are very good. Name in our next list.

Communications declined with thanks.—Folly, Photo.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—W. O. P.—Béginner.—F. L. O. S.—J. R. K.—Stereo.—Q.

In Type:—B. M. Brackenridge.—M. A. Root.—J. N.—R. Mason.—J. Walter.—An Artist and Photographer.—J. W. Robson.—G. H. W.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 62.—*November* 11, 1859.

THE GREAT SOLAR ECLIPSE OF 1860.

Though the total eclipse of the sun, which is to take place next year, will not be visible in England, it will be accompanied by so many interesting phenomena that we think a brief account of what those who may be more fortunately situated may expect to see, will be of interest to our readers, more especially to those who reside in British North America, who will have an opportunity of beholding it, and, we trust, of obtaining a photographic record of the appearances presented during its progress.

The eclipse will commence in California, and terminate on the borders of the Red Sea. Passing along about the sixtieth degree of latitude, and quitting the American continent at Hudson's Strait, it will cross the Atlantic to the Spanish shore, and, for some minutes, something like one-fourth of Spain will be in total darkness. The shadow will continue its course over Africa, crossing the Nile to the north of Dongola, and finally quitting the earth in Ethiopia.

During the eclipse the planets Mercury, Venus, Jupiter, and Saturn will be visible together, arranged in the form of a rhomboid—an occurrence so rare that some centuries will elapse before such a spectacle can be witnessed again; indeed, the eclipse itself will be of a character that will be unequalled during the present century. That England will take an important part in recording the appearances presented by the phenomena may be assumed as a matter of course; in fact, there is no doubt that continental *savants* will trust entirely to her for a description of the phenomena exhibited at Labrador during the passage of the moon's shadow over that station; while, as regards Oregon, we know that there are a sufficient number of eminent astronomers in the United States to feel certain that everything which can be done to render the observations complete will be fully carried out. That, however, which we desire more especially to impress on those who may find themselves in the path of the eclipse, is the absolute necessity for taking photographs of the sun's disc, as rapidly as possible, from its commencement to its termination, and more especially during the few minutes of totality, if an accurate representation of its appearance is to be preserved. The human eye is an admirable instrument, no doubt, but when we find that three persons looking at the same object, at the moment of some particular occurrence, cannot agree in their description of what was actually visible, we are disposed to believe that greater reliance can be placed on the record written by the occurrence itself, than on any account written by an individual. Moreover, where photography is employed to record the appearances presented, the mind of the astronomer is left perfectly free to note the changes of colour, of which our art takes no account. Unfortunately, there is little chance of England having the credit of producing the best pictures, as it is hardly to be hoped that our Government will incur the expense necessary to send out the requisite apparatus to Spain; it may therefore be presumed that France will have the honour of presenting to our learned societies proofs, showing how easily she would accomplish what we considered impossible, or not worth attempting.

We need scarcely say that a negative of the sun's disc, taken by an ordinary lens, would be of no use, owing to its diminutive size, as the distortion consequent upon enlarging it sufficiently to produce another negative, from which a photograph could be printed, would render it useless as a record of the appearances presented during the gradual passage of the moon over its surface; but we do not think it would be at all difficult for any amateur photographer to construct a very simple apparatus for taking photographs of the solar disc, of a tolerable size and sufficient minuteness to render them very valuable records of the transient phenomena which may be expected. We shall return to the subject of obtaining photographs of this eclipse in an early number.

PYROXYLINE CONSIDERED IN ITS CHEMICAL ASPECT.*

BY M. VAN MONKHOVEN.

Let us now consider the effect of water in the mixture of acids. For this purpose, take one volume of monohydrated nitric acid and two volumes of concentrated sulphuric acid, mix them, allow them to cool, and immerse therein a small quantity of cotton, which may be withdrawn at the end of ten minutes; then a second and a third, until finally the cotton plunged therein be dissolved. In this manner we shall have a series of gun-cottons prepared, apparently in the same acid, but, in reality, in acid gradually rendered more dilute, as each specimen of cotton has introduced water. But experience proves that there is also considerable difference between the specimens of gun-cotton thus obtained. The first portions are much more explosive, and more insoluble in alcoholised ether; the second are more soluble, but yielding, by evaporation upon glass, a thick, woolly coating, easily removed; the third yield, under similar circumstances, a coating presenting all the required qualities; and, finally, the fourth specimens are those dissolved. It, therefore, follows that the mixture of acids cannot be too concentrated in order to obtain a good photographic pyroxyline.

Again, the temperature at which these operations are performed, is by no means unimportant. Indeed, a mixture which when cool would produce a very explosive gun-cotton, will, at a higher temperature, produce one less explosive but more soluble. There are, besides, important variations in the quality of this last result, according as the mixture is more or less warm. These preliminaries will be shortly of the greatest use, when we are treating of the various methods of preparation of the pyroxyline. We will here describe in a few words the varieties of pyroxyline discovered by M. Béchamp.†

If ordinary pyroxyline be placed in a tube or in a retort, and it be submitted to the prolonged action of ammoniac gas, a portion of the nitric acid passes into the state of nitrate of ammoniac, the pyroxyline becomes slightly yellow and presents the following centesimal composition:—

Carbon	28·07
Hydrogen	3·32
Nitrogen	10·92
Oxygen	57·69
	100 00

This composition, to which M. Béchamp has given the name of *tetra-nitric cellulose*, is neither soluble in ether nor alcohol separately; but if a little of the ether be added to the alcohol, or *vice versâ*, it rapidly dissolves. It is precipitable

* Continued from vol. iii. p. 98.

† Annales de Chemie et de Physique, 3rd series, vol. xlvi.

by water in tolerably voluminous flakes, and these flakes do not conglomerate in drying.

This variety of gun-cotton is, in a photographic point of view, very important indeed. A collodion process has recently been introduced in England, consisting of an enormous increase of the dose of alcohol in proportion to that of ether. Our own experiments have not yet confirmed those of the promoters of this method, which, however, is of no consequence; but if our opinion has any weight, we recommend those engaged in this modified process to use a pyroxyline which has remained for an hour in ordinary, but concentrated ammoniac. It is sufficient for the cotton to be impregnated with this alkali, and it must not be used in excess. At the end of the time above-named, it should be well washed in water, and dried; it will then dissolve in alcohol, containing only a tenth part of ether.

Sub-nitric cellulose may be obtained (M. Béchamp) by the action of caustic potash upon the ethero-alcoholic solution of the pyroxyline. It is, like the latter, insoluble in ether, but the addition of a small quantity of alcohol produces solution. Concentrated alcohol dissolves it when cold; water with difficulty precipitates this solution, and the precipitate, which is of an extreme tenuity, conglomerates while drying.

PHOTOGRAPHY AND THE FINE ARTS.

M. Lafon de Camarsac has just published a paper on the subject of printing photographs on various substances, in the *Bulletin* of the French Photographic Society; but as it has already been given at page 219 of vol. ii. of the "Photographic News," we need only refer our readers to that number for the details. We shall merely mention in this place that he claims to have discovered a method of printing photographs on all kinds of substances, so as to render photography available for the decorations of ceramic manufactures, jewellery, goldsmith's work, &c. The process by which he operates at present is not stated, but we find, on referring to the *Comptes Rendus* of the Academy of Sciences, of June 11, 1855, that with pictures produced by the aid of collodion, albumen, or gelatine, he developed the image until the half tints were overdone, and the deep shadows were covered with a thick deposit. The proof was then placed in a muffle furnace, and submitted to the action of heat until the organic matter had disappeared. The whites of the picture, on tinted porcelain, coloured glass, or brown or black enamel, were formed by a deposit of reduced metal, which acquired great brilliancy in the furnace. On white porcelain, or enamel, or on transparent glass, the blacks of the picture were formed by the metallic deposit, which was subsequently treated with solutions of salts of tin, gold, or chromium; the image being fixed on the ground by a suitable flux, except in cases where the matrix itself was fused. In the case of images obtained by the action of light upon salts of chromium, as soon as they were fixed by washing in distilled water, they were exposed in a muffle furnace, until the gelatine was destroyed and the metallic deposit alone was left on the ground. Salts of silver and lead being laid on this deposit, produced a yellow colour on baking, and violet and purple tints were obtained by using salts of gold and tin. The method of using resins is not so clearly explained, but it would seem that he prepared a bituminous substance mixed with resin, which was susceptible of being acted upon by light, that he exposed this under a negative, developed the image, and then covered it with a finely-ground mixture of metallic oxides and their fluxes. On exposure to a proper temperature, the film was slowly destroyed, while the picture gradually penetrated into, and formed a portion of, the soft porcelain on which it rested. By this method a degree of half tone was obtained, which is unattainable by the ordinary process of enamelling.

It is not very clear why, since this process was discovered, in 1855, a greater use has not been made of it. M. de Camarsac, who, in the paper we have referred to at the commencement of this article, dwells rather pathetically on the little photography it has accomplished, compared with what was expected from it when it was first discovered, does not throw any light upon this point, nor does he explain in what consists the difference between his process of to-day and that of four years ago. He speaks in very sanguine terms of the advantages that may be derived from his discovery, and dwells on the value of a process which will allow of facsimiles of rare engravings, portraits, works of art, &c., being taken in a manner which shall render them almost indestructible. He has presented to the Society specimens of two kinds: pictures formed of vitrifiable substances, and fixed by fire on enamel, one of which is done in gold, to which a flux was added; the other, of varied tints, was obtained photographically. Also pictures on paper, formed of different substances, especially of carbon.

We believe that no specimens of what M. Camarsac has done, in the way of applying photography to the ceramic art, have been exhibited in this country, and we would advise him, if he wishes to make it known in the only country where new inventions are readily adopted, to communicate with the Secretary of the Crystal Palace, at Sydenham, on the subject, with a view of getting specimens exhibited in the ceramic department in that building, when, if his process is of real utility, he may rely on its being practically carried out, manufacturers in England being as ready to adopt improvements as French manufacturers are the reverse. As to the photographs in carbon on paper, we are able to say that if the specimen sent to us is a fair average specimen of what he can accomplish by his process, it is not likely to be excelled. The subject is one of considerable difficulty, being the portrait of a lady, yet it is wholly devoid of granulation—the drawback which every other carbon print we have seen has presented.

PHOTOGRAPHY AT THE WAR DEPARTMENT.

The adaptation of photography to the wants of the military service is likely to receive a further confirmation, from the efforts now making to extend to the regiment of Royal Artillery, in Woolwich, the advantages long enjoyed by the Royal Engineers, at Chatham, where a system of instruction in photography has already been productive of great results. We are informed that not only have the officers of the Royal Artillery availed themselves, to a considerable extent, of the advantages to be derived from the practice of photography, by enlarging that department in their institution, at Woolwich, but that it is proposed to extend the same privileges to a certain number of non-commissioned officers, among those attending the full course of instruction in the Royal Military Repository. Already a class, numbering some eight or ten sergeants, has commenced a course of practical instruction in photography, under Mr. Spiller; and it is anticipated that a small but effective corps will soon be capable of using the camera, and available, if required, for the purposes of securing to their regiment the advantages of photography, in the almost infinite variety of ways in which our art is likely to prove of service to the army.

Critical Notices.

STEREOGRAMS FROM CHINA.*

FIRST NOTICE.

While Mr. Albert Smith is delighting visitors at the Egyptian Hall with his clever and amusing descriptions of China and the Chinese, Messrs. Negretti and Zambra are labouring to issue, as rapidly as possible, stereoscopic pictures which may serve to illustrate the places and objects to which he refers. In the notice of the picture of the Taal Volcano, which we gave last

* Stereoscopic Views of China from Negatives taken by the Wet Collodion Process by Messrs. H. Negretti and Zambra. Published by Negretti and Zambra, Hatton Garden.

week, we referred to the fact of this eminent photographic publishing firm having sent out a photographer on a special mission to the East; and in the prints before us we have part of the results of his labours in that quarter of the globe. China and the Chinese is one of the very few distant countries and peoples in which the Englishman feels a lively interest. As a general rule, his interest in foreign countries decreases in the ratio of their distance from the shores of the "sea-girt isle;" but from different causes China forms an exception, and events looming in tho imminent future strengthen this feeling, and will most assuredly heighten it still further before the inhabitants shall have received the chastisement which England proposes to inflict upon them for their brutal attack on our countrymen.

The stereoscopic prints, hitherto published, are from negatives taken in and about Canton; and whatever may be said of the unfairness of forming an estimate of Chinese character from the manners of the Cantonese, we have never heard it said that in outward appearance, dress, and architecture, Canton and its inhabitants may not be taken as a specimen of what one would meet with in any Chinese town; it may, therefore, be fairly assumed that these stereograms give us accurate representations of what China and its people are like.

The first of the series we take up is a panoramic view of Canton. This view embraces the city of Canton from Magazine Hill, the head-quarters of our troops, to the Canton river, which is represented by a faint streak in the extreme distance; in fact, the extent of the view it includes has given rise to a certain degree of haziness in the most distant part of the picture, which somewhat detracts from its value as a finished print, though it does not destroy the interest with which we regard the representation of the enormous city which stretches away before us.

After the panoramic view of Canton had been taken, the camera was turned towards a conspicuous and interesting object situated on the walls at the extreme end of the city; this was the five-storeyed pagoda—a building which is now occupied as barracks for our troops, whose linen, suspended from lines carried along the upper storeys, is as distinctly represented in the picture as the building itself, notwithstanding the distance from which it was taken. Judging of the city wall, from its appearance in this picture, it must be of a formidable character, and of considerable strength, the ground on which it stands sloping down to a great depth. A road, bordered by trees on the one side, and by stones regularly placed on the other, leads up to the pagoda, and between it and the wall we see a cluster of houses, the external appearance of which differs but slightly from the slated cottages we meet with in most villages in England. It will give some idea of the fidelity with which objects are depicted in this print, if we mention that in the most distant part of the wall we can readily distinguish the embrasures. In occupying this building as a barrack we have, probably, yielded to a necessity, but it must greatly exasperate the few natives who possess any religious feeling.

The view of the landing place at Canton is an exceedingly interesting picture. In tho foreground we see a couple of Chinamen squatted down beside their palanquin, the centre being occupied by the jetty—the principal use of which, if one were to form an opinion from the print, is to serve as a resting-place for idle natives and dark-skinned sepoys, who are seen in the very attitude in which we are accustomed to behold the figures of their gods.

At the end of the landing place stands the commissariat house, looking very much as if it had been formerly used for purposes of refreshment—an idea which is strengthened by the appearance of a white-clothed sepoy standing cross-legged in the doorway. In the water we see sundry buildings supported on piles, and right across the river houses and junks in abundance, while along the edge are heaps of bombshells, which our men rolled into the water because they were useless —a work of supererogation, as it seems to us, because it would surely have been better to have left the Chinese to find out this some day when they desired to use them against us.

In the Temple of the Five Genii we have a building made of brick, adorned with inscriptions in Chinese characters. From the basement rise numerous columns, which support a roof of the style peculiar to the Chinese. It is very extensive, and we are told the Chinese hold it in great veneration; indeed, they show you, within a walled inclosure in this building, a hole, which they assert to be the impression of the foot of the Genie of Canton, which was made when he took his flight thence to heaven; but as this hole is about ten feet long and three feet wide, the assertion may with reason be doubted. This temple, being in the Tartar quarter of the city, suffered considerably from the bombardment. It contains the largest bell in Canton, which used to be carefully guarded from access in consequence of a tradition attaching to it, that, whenever it was struck, ill would befall the city. By a coincidence which, under the circumstances, can hardly be considered remarkable, this bell was struck by a cannon ball during the bombardment, and fractured, and it is not difficult to believe that the ominous sound must have produced a strong effect on the minds of the defenders of the city. The panoramic picture taken from the walls of this building exhibits the effect of our shot and shell on the houses in the immediate vicinity of the Temple; roofs are blown to pieces, walls are shattered, and those which still stand look as if it would require very little force to level them with the ground. In the centre of this view is the Mussulman Pagoda, the erection of which is ascribed by local tradition to the son or brother of Mahomet. It is a very lofty building of a circular shape, not unlike the shot tower at Lambeth, but having a smaller circular tower springing from its summits, the view from which must be of very great extent. We get another, though very distant, view of this same tower in a panorama taken from the south gate. The picture shows that this part of the city escaped better than that represented in the print we have just noticed, though a shattered roof ornament and a hole in the roof itself prove that it did not escape unscathed.

A panoramic print, taken from the walls and looking outside the city, is a beautiful picture, which leaves nothing to be desired. The most conspicuous object in it is a building, partly in ruins. This was formerly a prison, and the Chinese troops, thinking it was occupied by our soldiers, made an attempt to blow it up; it so happened, however, that it was not so occupied, and all tho Celestials took by their motion was to attract the attention of the British to their presence, who consequently fell upon them, and, before they could make their escape, killed a considerable number. It was at this spot that the braves made a last and vain attempt to retake their city. The appearance of the building attests the force of the explosion, and renders evident the reason our men had to congratulate themselves on their absence when it took place.

In No. 13 we have an excellent picture, which is described as a panorama overlooking Treasury-street, the most prominent object in which is a triumphal arch, one of many which are built over this street. In this picture we have examples of the impromptu manner in which the Chinese sometimes manufacture roofs: three straight beams being brought down from a higher building, and resting on a cross piece of timber, supported by posts, and loose planks being thrown across these beams, the sole use of which must be to give shade, for they are incapable of keeping out rain. The roofs of the houses seen in the panorama of Canton, taken from the south gate and looking to the north of the city, present a very singular appearance. At first sight, ono would imagine that they were covered with bomb-shells—closer inspection shows that these are jars; the object of placing them in this curious situation being to render their contents—for they are kept filled with water—available in case of fire; no unnecessary precaution, when we consider the immense quantity of bamboo matting which, as we see in the picture, extends, with few intervals, the whole length of the street. In the view of Canton taken from the walls on the west side of the city, is included the Temple of the Five Genii to which we have already referred—the celebrated nine-storeyed pagoda, which occupies the centre of the background. This print illustrates in a striking manner the chances of a bombardment. The eye ranges over an extensive series of house-tops, yet thero is only one which seems to have suffered damage, and this has lost nearly half its roof. Tho next picture we take up is of a very different character; instead of having to seek for evidences of the effects of our operations, the eye is at once attracted to a heap of ruins. These are the remains of some buildings just within the walls, from which the "braves" used to fire upon our men until they were knocked down about their ears. A sort of canal winds through tho centre of the picture, on one side of which are built some rather quaint-looking houses, which are entered by steps from the water. There is nothing peculiarly Chinese in their appearance, but, taken in connection

with the surrounding objects, they form a very pretty and interesting subject. Beyond the walls we have a representation of Canton river, with, as we are told, the Island of Honan in the distance; in fact, it is so very distant that we are unable to distinguish it; we have no difficulty, however, in distinguishing the junks scattered about the river, nor the fact that two European war vessels are lying there at anchor.

The view of the south-east suburbs, taken from a small pagoda, is a picture of utter desolation. Brick buildings, with doorways which reach nearly to their roof, but devoid of doors, form the foreground of the scene; not a trace of life is anywhere visible, while the dilapidated condition of some of the buildings is sufficient to prove that the inhabitants did not abandon their dwellings without sufficient reasons. Considering the extent of the field of view which this picture embraces, there is a remarkable absence of edifices, the architectural design of which can be looked upon as peculiarly Chinese. In fact, we might almost fancy we were looking over Bermondsey from an elevation on the South Eastern Railway.

A good idea of the height of the wall which surrounds Canton might be derived from a view taken from the west gate. We have here a portion of the wall, in the lower part of which a breach was made by our guns, of considerable dimensions. Its surface is marked, in various places, by the concussion of the balls, one of which, or a shell, passed completely through, as if it had been made of wood. A well-worn path runs along below the fortifications, and in the hollow below this is seen an extensive piece of ground, covered with rows of poles, the use of which is not very evident. In another part, we are shown the present appearance of the west gate itself, taken within the city walls. Beside the zigzag footpath which leads up to it, we discern the fragments of the embrasures, which lie dispersed among the long, coarse grass of the ramparts, those which encumbered the path being thrown in a heap in the hollow between the path and the houses. The same gate, taken from the outside of the walls, presents a far more imposing appearance, and, as a photograph, is also much superior to the other. It was at this point that the so-called braves, who really seem to have some claim to the title, made two attempts to recapture the city, but were repulsed with considerable loss. We get a rather better view of the wall in this picture than in either of the others, and it is very easy to see that it is of considerable solidity, and by no means resembles the pasteboard forts with which the Chinese once sought to terrify us; the discovery of which stratagem has done more to spread the prevalent idea that there is nothing real in China than any other thing. This entrance looks deserted now; but so distinctly is every feature brought out in the stereoscope, that it is not difficult to people the scene in imagination with the struggling mass of men engaged in savage conflict, and to persuade one's self that one can hear the yells and curses which men give vent to when engaged in the horrid work of butchering their fellow-creatures.

The picture of the south gate gives us a thorough representation of a Chinese building, which is now used as a police station by the English. Beneath the verandah we see a crowd of English and French soldiers, who do duty as police, with a few Chinamen scattered about among them. On a board which has been nailed to the wall immediately over the street, we see, inscribed in well-executed letters, "South Gate—Porte du Sud," and beneath, in similar characters, which cannot be very intelligible to John Chinaman, "Kwei Tin Mun." How the Chinese manage to distinguish the commodities in their shops in the street below is rather a puzzle, for we see that the roofs of the houses almost meet across it, and the interval is filled with bamboo matting.

The Moon in the Stereoscope. Photographed by Samuel Fry, Brighton.

In our second volume, page 75, we had occasion to notice some beautiful lunar photographs by the above artist. We have recently seen another picture of the same luminary, which possesses some superiorities over those before noticed. The two halves of the stereogram before us were taken respectively on the 23rd of November, 1858, and the 14th of October, 1859, during which interval the moon had varied in longitude and libration about 6¼° of her surface. The pictures represent the gibbous moon; and it was a great point in these photographs to represent distinctly the craters and volcanic cones on the western side. These, owing to the obliquity of illumination, may be seen with the shadows of the opposite edge distinctly thrown across the basin, and very materially heightening the effect. We need hardly say that these pictures, taken as they were at an angle of 6¼°, give a perfect appearance of rotundity and relief, when combined in the stereoscope, especially when we tell our readers that this angle is equivalent to a separation of the lenses of the photographic camera to a distance of about 22,000 miles! The pictures were all taken at the observatory of C. Howell, Esq., at Hove, near Brighton, whose excellent equatorial was placed at Mr. Fry's disposal for this purpose.

We have also been favoured by Mr. Fry with a specimen of an instantaneous sea view. It is a representation of a stormy-looking sea and sky. One or two vessels are seen scudding along, and a black, angry-looking cloud to the left of the picture contrasts well with the gleaming sunshine in other parts, and seems to promise dirty weather. The waves are not quite so successful as to sharpness as some we have seen; but the light and shade are very fine, and the atmospheric distance, with the sky, water, and, we might almost say, *wind*, combine together to make a very effective picture.

Dictionary of Photography.

Hydracids.—This name is applied to those combinations of the elements with hydrogen which possess acid properties.

Hydriodic Acid.—A compound containing one equivalent of iodine, and one of hydrogen. In combination with basic oxides, it gives rise to *iodides* with formation of water; in the free state, it is not used in photography.

Hydrobromic Acid.—A compound of equal equivalents of bromine and hydrogen. It is an acid of similar properties to hydrochloric acid, and unites with basic oxides to form bromides.

Hydrochloric Acid.—An acid consisting of equal equivalents of chlorine and hydrogen. In the pure state it is a colourless gas of a pungent odour, incombustible and incapable of supporting combustion. Water absorbs it with avidity, forming the ordinary pure hydrochloric or muriatic acid of commerce; one volume of water absorbing nearly 500 volumes of the gas. One part of hydrochloric acid and two parts of nitric acid make what is called *aqua regia* or nitro-hydrochloric acid, which dissolves gold, platinum, and other noble metals. It unites with basic oxides forming chlorides.

Hydrogen.—This element having so recently been described in our Photographic Chemistry, need not be again referred to here.

Hydrosulphate of Ammonia, or, as it is more commonly called, *sulphide of ammonium*, is a compound of one equivalent of ammonia, and one of sulphuretted hydrogen. It is always used in the form of its aqueous solution, which, in a pure state, is colourless, although, in contact with the air, it quickly becomes yellow. It is of a very disgusting odour, recalling that of sulphuretted hydrogen, and is of use in photography to precipitate silver from its solutions in cyanide of potassium, or hyposulphite of soda.

Hydrosulphuric Acid, or *sulphuretted hydrogen*, is a gas composed of one equivalent of sulphur and one of hydrogen. It is soluble in one-third its bulk of water, and is distinguished by its most offensive odour, being similar to that of rotten eggs: it is poisonous. Hydrosulphuric acid precipitates silver from its solutions in the form of a black sulphide, and causes the formation of the same substance whenever it comes in contact with either metallic silver or any of its compounds. The slightest trace of sulphuretted hydrogen in the atmosphere would prove most injurious to any sensitive photographic surface to which it might have access; consequently, photographers should be very careful not to carry on photographic operations where any similar odour can be distinguished. Besides rotten eggs, sulphuretted hydrogen is met with in some mineral waters, in sewage water, and generally in putrescent animal matter.

Hyposulphite of Soda.—This salt, composed of soda

and hyposulphurous acid, is obtained by boiling flowers of sulphur with a hot and strong solution of sulphite of soda; on evaporation the salt is deposited, and may be purified by re-crystallisation. As the commercial salt is frequently adulterated, its purity may be readily tested in the following manner:—Weigh out 10 grains of iodine and 20 grains of the hypo. to be tested. Dissolve the hypo. in half an ounce of water, and add to it the iodine in fine powder; allow it to stand for about ten minutes, shaking it frequently during that time. If the hypo. be pure, the iodine will have entirely, or nearly, disappeared, and if impure, some of it will be left as a black powder at the bottom; the amount of impurity in the hypo. will be in proportion to the amount of iodine left undissolved. Hyposulphite of soda dissolves with great readiness many silver salts which are insoluble in water, such as iodide, bromide, chloride, and cyanide of silver; whilst it does not attack the sulphide or metallic silver. It is, consequently, of very general use in all the photographic processes as a convenient, and, if carefully used, a safe fixing agent.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS.—PRINTING FROM GLASS NEGATIVES.

As the reader may naturally desire to obtain a positive proof from any negative which he has taken, I will proceed to give him the necessary instructions for so doing; although, perhaps, my doing so at this time may somewhat interfere with the order or arrangement which I had intended to carry out in this series of articles. I think, however, that so long as the student is made acquainted with the progressive stages of the art, so that he can obtain results which are pleasing to himself as well as gratifying to his friends, it may be judicious to depart a little from any rigid plan which would render the study too elaborate, and the most pleasing results too distant from his view.

It is proposed, therefore, now to treat of the art of photographic printing, by means of which the student may at once proceed to obtain positive prints from his negatives.

The *nitrate bath*, for sensitising the paper, is composed of:—

Nitrate of silver (fused)	60 grains.
Distilled water	1 ounce.
Glacial acetic acid	2 drops.

Dissolve the silver and then add the acid, which may be dispensed with, if preferred. The object in adding acetic acid to the bath is to prevent the formation of metallic spots upon the paper, but so long as the paper remains free from those spots the acid is unnecessary. This bath should be kept in a bottle and labelled "Nitrate Bath—60-grain," so that it may not at any time be confounded with the aceto-nitrate exciting bath.

When using the sensitising bath, it is to be filtered into a flat porcelain dish, with a lip to it, and which should be kept for this purpose alone. The student will do well to make about four ounces of this solution, which will be sufficient to sensitise a good deal of paper to print from negatives taken upon sixth size glasses.

The *toning bath* must be made as follows, and the quantities given will enable the student to "fix" and "tone" a considerable number of small proofs:—

Chloride of gold	4 grains.
Hyposulphite of soda	4 ounces.
Water	8 ,,

First, weigh out the gold, and dissolve it in one ounce of distilled water; next, weigh out the hyposulphite of soda, and dissolve in seven ounces of water—common water will do very well for this. The chloride of gold will dissolve instantly, but the hypo. will take time; this may be hastened by repeated stirring.

When the hypo. is thoroughly dissolved, the solution of gold may be added to it gradually; but the hypo.-solution *must be well stirred* all the time, or the gold is apt to become reduced. It is absolutely necessary to add the solution of gold to the hypo., and not the hypo. to the gold, or the operation will be a failure. When this operation is complete, the toning bath is ready for use. It should be kept in a wide-mouthed bottle, labelled, "Toning Bath;" and, when it is required to be used, the bath should then be poured into a rather deep porcelain dish with a lip to it, so that it may easily be decanted into the bottle when not in use. The dish in which the toning bath is used should never, on any account, be used for any other purpose.

I presume that the student is provided with a "pressure frame"—that is, a frame in which the printing process is effected. Several folds of blotting paper should now be cut to nearly the size of the glass of the frame, which is to be used to equalise the pressure upon the negative, as I will further explain hereafter.

It will now be advisable to cut up a sheet of albumenised paper into sizes suitable to the size of the negatives, but, of course, somewhat larger. To save time in sensitising, these pieces of paper may be large enough for four proofs.

Next, having filtered the nitrate bath into the flat porcelain dish, take up one of these papers between the thumb and finger of both hands, keeping the albumenised side downward, and, by bringing the hands close together, the paper will represent the form of an inverted arch; now gently lower the convex surface of the paper upon the solution, and then one of the ends, quickly following with the other; this should be done pretty quickly, or the paper may be streaky. As soon as the paper has *floated* for an instant, it must be partially raised by one corner, which may be done with a pair of horn forceps, in order that the operator may see if there are any air-bubbles present; if so, they may be lightly touched with the tip of the finger, and the paper again be laid upon the solution, where it must remain altogether for *five minutes*. As it is absolutely necessary to *float* the paper, and not to immerse it, care must also be taken not to allow the upper surface of the paper to become wetted by the nitrate solution, as this is apt to form a stain in the subsequent print. When the paper has floated the proper time, it is to be taken up by one of its corners, and then it must be pinned upon a tape line, or in some other convenient way, to dry; black pins should be used for this purpose. For the sake of economy, the nitrate of silver which runs off the paper should be allowed to drain for some time into the dish; when the nitrate has nearly ceased to drip, a piece of blotting paper should be attached to the wettest corner of the paper to facilitate the drying.

It must be borne in mind, that the chloride of silver which has now been formed upon the albumenised surface of the paper, is very readily acted upon by light; therefore, it will be necessary to keep the paper in a dark place, more especially when it is dry. It is not absolutely necessary, however, that the process of sensitising the paper should be conducted in the dark room, but it is well to avoid a very strong light.

When the first sheet of paper has been removed from the solution, another may be floated in the same way; but much time must not be allowed to elapse between the sensitising of one piece of paper and another, or marbled stains will appear upon the next piece of paper, which will spoil it. If, however, more than a few minutes should elapse after sensitising a sheet of paper, it is well to pass a strip of blotting paper over the nitrate solution, which will remove any objectionable matter. These last remarks, however, more generally apply to a bath which has been used a good deal.

After the nitrate bath has been long in use, it is apt to become discoloured, of a reddish tint; when this occurs, add a few grains of *kaolin*, or China clay, shake the bottle, and filter before using. The kaolin will entirely remove the colour, if sufficient has been used. It is very important that the nitrate bath be not used when it is much discoloured, as very indifferent proofs will be obtained if so, the whites generally being impaired by the colouring matter.

When the sensitised paper is *perfectly dry*, it is a good plan to keep it between several folds of brown paper, so as to flatten it, and, at the same time, protect it from the light.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Cutting glass is effected in a variety of ways. Glass tubes may be cut with files; or rather, sufficiently notched to be broken. Care must be used, especially with tubes of large diameter and thin substance, not to use too much pressure,

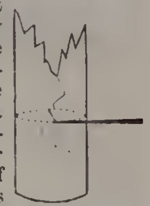
which would break the glass. The notch is to be produced rather by friction than force. If the tube be of large diameter and any considerable thickness of glass, the notch should be deep and carried well round the tube before any attempt is made to break it. Indeed, in some cases, it will be safer to use a little turpentine with the file, and, as nearly as possible, cut the tube in two. The same plan may be adopted in cutting small phials. When the tube is sufficiently notched, a slight lateral strain, as in breaking a stick, is to be applied, at the same time pulling the ends apart.

Cutting or dividing glass by means of heat is effected in various ways. In a method very commonly recommended for dividing tubes, flasks, bottles, &c., a piece of string saturated with turpentine is tied round the part to be cut, and then set on fire, immediately after which a little water is dropped on the heated part, or the whole is plunged into water, when a fracture occurs from the sudden cooling of the glass. This method is, however, very uncertainly successful, and the fracture often irregular. Another and more certain method of applying the same principle is found in the use of a ring of tolerably thick iron wire, like the figure in the margin. A few pieces of wire should be bent into circles of different sizes, as the success of the operation depends on the circle nearly fitting the cylindrical glass to be divided, so as to be in almost immediate contact all round. The wire should be heated red-hot and applied to the glass for a few moments, and, immediately after its removal, a little water dropped on the heated part. If the ring be of the right size the heat is applied in this way with much more regularity and certainty than by means of the ignited string—which burning with a flame generally spreads the heat—and on application of the water an even fracture generally follows. Certainty in the process may be promoted by making a slight scratch at the point to be divided with a file or diamond. In another method of effecting the same thing, and one in skilful hands generally successful, heat is generated by rapid friction on the glass with string. It is necessary in this method to have some means of confining the friction to the line of division. This may be done by firmly binding two pieces of string round the bottle or tube to be cut, at such distances from each other as will leave a groove for the string which is to produce the friction to run in. This latter piece of string must now be fastened to something firmly at one end, and a single coil made round the glass in the groove; the other end is held tight in the operator's hand; the glass must then be moved rapidly backwards, and forwards, from one end of the string to the other, causing the coil in the groove to revolve rapidly, and thus, by the friction, generate considerable heat. After a few minutes' friction the glass is to be plunged into cold water, when, if sufficiently heated, a perfect fracture will follow. The string producing the friction should be a piece of well-twisted cord, or there will be danger of the chafing destroying the string before sufficiently heating the glass. If the glass be slight and fragile, there is some danger of crushing it in this process. We have successfully divided glass by each of these methods; but there is some uncertainty attending all.

Leading a crack by means of a burning point is a method of dividing bottles, &c., much easier to perform and more to be relied upon than any of the preceding methods. To the novice it is very interesting to observe how a slight crack already in existence will follow in any direction a red-hot point applied to it. Anything which will retain a red-hot point will serve the purpose of leading the crack; but the most elegant and convenient method of effecting the process is by means of spring-coals or pastils prepared for the purpose. Unless the amateur intend frequently to use the process, however, the preparation of the pastils will be an unnecessary trouble, as the end may be effected by simpler means. There are several formulæ for the preparation of these pastils; the following is, perhaps, the most simple:—Half an ounce of gum tragacanth is to be powdered, and reduced to an elastic mucilage with sufficient water. After they have macerated together for an hour, add a quarter of an ounce of gum benzoin dissolved in alcohol, and rub them together in a mortar; then add and mix in as much powdered charcoal as will form a tenacious paste. When this paste has been thoroughly kneaded, it is to be rolled into sticks the size of an ordinary pencil, and suffered to dry slowly.

If no previous crack exist, a slight notch should be made with a file or diamond. A line should be made round the bottle with ink or chalk, to guide the incandescent point accurately. The pastil being ignited and burnt to a proper point is to be applied to the glass about a line, or one-twelfth of an inch from the crack or notch, in the direction of the intended division; the crack will immediately run to the burning point, which is then to be slowly drawn round by the guiding line, the crack steadily following. Sometimes, instead of drawing the red-hot point in a continuous line round the glass, it is better to lift it from time to time, making, as it were, a dotted line, holding the burning pastil each time on the spot until the crack has come up to it, then lifting it and replacing again about the eighth or twelfth of an inch further on, when the crack will again run up to it; and so repeat the process until the operation is finished. As a crack may be led in any direction, a division of any shape may be thus effected.

Instead of pastils a piece of tolerably stout iron wire may be made red hot at the end and used with perfect success, its only drawback being the rapidity with which it cools, if a large bottle require dividing. As this merely involves the necessity of reheating once or twice during the operation, it is not a disadvantage of importance. We have, with a piece of wire about one-fourth of an inch thick, divided a carboy six or eight inches in diameter, the glass one-third of an inch thick, in two or three minutes. Perhaps nothing answers the purpose better, and with less trouble and expense, than the stem of a tobacco pipe heated at the end.



By this method of division useful cups may frequently be made from broken bottles, which otherwise would be entirely useless. The engraving shows the method of applying the red-hot point.

(*To be continued.*)

Photographic Chemistry.

HYDROGEN—(*continued*).

It is often necessary to operate with dry gases; in this case they are not collected over water, but over mercury, in a vessel made for the purpose. The jar in which the gas is collected is thoroughly dried by warming, then filled with mercury, and inverted in the trough, precisely in the manner indicated with regard to water. To dry the gas, a piece of some substance very greedy of moisture is introduced, as fused chloride of calcium, for example; or another method is adopted, viz., that of passing the gas as it is generated through a tube containing bits of pumice stone, which have been calcined in a crucible, and steeped in concentrated sulphuric acid. We have already mentioned that the hydrogen gas, as generated, is impure, in consequence of the zinc containing impurities, and that it may be freed from this unpleasant odour by being passed through certain substances. A very good plan is to pass it through long tubes, bent in the form of the letter U, the first containing a concentrated solution of caustic potash; the second a solution of perchloride of mercury; the gas emerges from the latter free from all smell, and only mixed with aqueous vapour, of which it may be deprived by passing it through a third tube of a similar shape, filled in the manner indicated above.

The combustion of hydrogen in the atmosphere, or in oxygen alone, produces water.

We know of two combinations of hydrogen with oxygen. The first of these, the protoxide, is water; the second is termed binoxide of hydrogen.

The proportions in which the two gases combine to form water can be ascertained in different ways. If two graduated glass jars are inverted over two platinum plates, immersed in acidulated water, connected with the poles of a voltaic battery, decomposition of the water takes place, the plate connected with the copper end of the battery gives off pure oxygen, while that which is connected with the zinc gives off pure hydrogen. An examination of the measure shows that, making a very slight allowance for oxygen being more soluble in water than hydrogen, the volume of the latter is just twice as great as the former. Another method is to fill the eudiometer, invented by Cavendish,

with the gases mixed in the proportion above mentioned, first exhausting the receiver at the air-pump, and exploding an electric spark therein. The sides of this vessel are covered with moisture, and if a stopcock, with which it is fitted, be turned under water, the liquid will rush in and fill it; thus proving that there was a perfect vacuum.

Pure water is without taste or smell, and is transparent and colourless, in small quantities; it is only when of great depth, as in the sea and some few lakes, that it assumes an ultramarine or greenish tint. It is never met with in a pure state, the passage of the water through the soil invariably contaminating it with soluble substances, from which it can only be freed by distillation. Even rain is not pure, it contains traces of ammoniacal salt, and occasionally of nitric or sulphuric acid. It is to the peculiar nature of the soil through which the water passes that is owing the existence of certain minerals in springs, to which medicinal properties are ascribed.

Water exists both as a solid and a liquid. It becomes a solid when its whole mass is reduced to a temperature of 32°, and this circumstance has been taken advantage of in arranging the fixed points of the thermometric scale. If we take a vessel filled with ice into a warm room, it will gradually melt, but so long as any portion of the ice remains in the liquid the thermometer will remain at freezing point. In freezing, water increases in volume with a force which is irresistible; the thickest bomb-shells have been burst by the expansive force it exerts under those circumstances, and immense masses of rock have been detached from cliffs by the same cause.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 8th November, 1859.

At the last meeting of the Academy of Sciences at Paris, M. Robiquet, assistant professor at the School of Pharmacy, and author of the little work on Photography which I have already mentioned in these columns, read the results of some investigations he has been making on the lines of the solar spectrum, and on those of different spectra obtained with the electric light, or otherwise. I cannot do better than give you here the principal conclusions of this paper in the author's own words:—

"Any body in an incandescent state, whatever be its chemical nature, gives a spectrum devoid of lines. If the body in question is volatile, and in volatilising surrounds itself with a colourless and transparent vapour, the lines are not yet perceptible; but if the vapours thus produced are heavy, easily condensed at the temperature at which we operate, and, naturally enough, if they are at the same time coloured, they intercept a more or less considerable part of the total radiation.

"To explain the action of these vapours, they cannot be better compared to anything than to a screen formed like a gridiron, the bars of which are at unequal distances from one another, and vary in thickness, being sometimes extremely thin, and sometimes having a considerable diameter. *In the first case*, the shadow projected shows itself in the shape of dark lines, extremely narrow (lines of the solar spectrum); *in the second*, the masked or intercepted rays are very numerous; real dark bands make their appearance, between which are seen luminous and coloured parts, which appear like so many brilliant lines (spectra of metallic arcs produced by the pile).

"When the spectrum is formed by incandescent particles, transported mechanically, either by the electric fluid of the pile, or by the electric spark, secondary brilliant lines appear, which are easily distinguished from the rest by their intermittent character.

"The invisible portion of these different spectra is governed by the same effects of absorption as the visible portion, and these effects may be rendered sensible by photographic means."

It appears, from the author's own remarks, that he intends to continue these experiments, and to complete the work he has begun. One of the tasks he has proposed to himself, is that of photographing both the visible and invisible parts of the spectra, produced by "the light of the stars" and by the electric light. Of the paper to which we allude, all that has as yet appeared in print are the conclusions above, which I have translated literally. I hope that when M. Robiquet's paper appears, *in toto*, I may have again occasion to refer to it.

M. Denier, a photographer, of St. Petersburg, has lately sent to the Paris Academy a series of very large portraits, which have been much admired. They are nearly natural size, and were produced in one operation, by an instrument constructed expressly for the purpose, by M. Voigtlander, from indications furnished by M. Denier.

At the meeting of the British Association, at Aberdeen, a few weeks ago, Dr. Oppenheim read a paper "On the comparative Value of certain Salts for rendering Fibrous Substances non-inflammable." I have not yet seen Dr. Oppenheim's paper, but Mr. Graham remarked on that occasion, that the investigation of this subject had been undertaken, in the first place, at the wish of Her Majesty Queen Victoria, who longed to see some mode discovered by which light dresses might be rendered less liable than at present to endanger the lives of their owners by catching fire. For this reason, I give you here the contents of a note, lately published in Germany, by Messrs. Dœbereiner and Elsner, and entitled "On the best means of Diminishing the Combustibility of Tissues." The salts, which, up to the present time, have been employed or proposed to render organic substances less combustible, are borax, alum, soluble glass, and phosphate of ammonia. For wooden constructions, and strong, coarse tissues, it is a matter of indifference which of these salts be employed; but it is quite another question when it is wished to diminish or prevent the inflammability of those fine, light tissues, which are precisely those most exposed to accident. Borax renders the tissue hard, it soon goes to dust, and has the propensity of swelling when the tissue is ironed. Alum presents nearly the same inconveniences, and possesses, moreover, a very noxious property, namely, that of rotting or corroding very fine tissues, and rendering them liable to tear with the least effort. Soluble glass makes linen and cotton materials hard and brittle, and has also a certain destructive action on the tissue; it likewise diminishes the elasticity and the tenacity of the fibre.

Phosphate of ammonia alone presents none of these defective properties. It can be employed mixed with a certain quantity of any other salt of ammonia; it can be introduced into the starch used to stiffen the various fabrics, or it may be dissolved in twenty times its weight of water—the tissue soaked in this dissolution, and afterwards dried in the air, ironed, &c., as usual. The price at which commerce can furnish this phosphate of ammonia is quite low enough to enable it to be employed after every washing.

According to these authors, *phosphate of ammonia* unites, then, all the *desiderata* concerning the diminishing of the inflammability of light tissues. It can be obtained in various ways from bones, animal black, &c. For my own part I should like to see it partly or totally substituted for the *chloride of lime*, of which such abuse is made by the Parisian *blanchisseuses*, who destroy new linen, cotton, calico, or any other vegetable material in about three weeks; and I have no doubt the same thing occurs commonly enough in London.

I am really astonished that, in nations so advanced in civilisation as England and France, there are no police regulations by which the washerwomen would be obliged to soak the linen and cotton materials submitted to their hands in a solution of carbonate of soda, after they have undergone the action of the *bleaching-powder*, or chloride of lime. In this way, a great part of the evil attending the use of bleaching-powder would be done away with. After the tissues have been bleached, they should be immediately plunged into a good solution of carbonate of soda, which

would neutralise the chlorine that adheres to them, and causes them to rot.

M. Gaultier de Claubry has lately made known a new method of analysing gaseous mineral waters. To estimate the carbonic acid gas existing in a free state in a mineral water, the author passes through the water a current of air, which has the property of carrying off with it out of the liquid all the free carbonic acid gas, leaving intact that which holds lime or magnesia in solution as bicarbonate. The carbonic acid thus expulsed is condensed in a Liebig's tube, and weighed, as in organic analysis. If the water is ferruginous, the current of air should be replaced by a current of hydrogen. In the same manner (by a current of hydrogen gas), free sulphuretted hydrogen may be expulsed and estimated, like carbonic acid. In determinations by this method, the current of gas or air is passed until the bubbles of gas which traverse the liquid cause a trouble in its transparency. The current must then be immediately stopped, or the bicarbonates in solution would be decomposed.

M. Barbet gives us an easy method of distinguishing tartaric and citric acids. The crystals being placed upon a piece of glass, are covered over with a slight quantity of a diluted solution of potash. In a few seconds, the crystals of tartaric acid become opaque, and are converted into a mass of smaller microscopic crystals. Those of citric acid do not change in appearance; they simply dissolve themselves slowly in the potassic solution. This method may be employed to recognise citric and tartaric acids mixed in powder. The powder is placed under the microscope, and treated as above with a solution of potassa.

Dr. Phipson has lately analysed a newly-formed rock, discovered by him some time ago on the coast of Flanders. This rock, which, to all appearance, is still forming at the present day, was first described by the author in the *Comptes Rendus* of the Paris Academy of Sciences (23rd of March, 1857). It is likewise mentioned in *The Geologist*, of London (vol. i.), as being daily deposited from the sea, about a league from the coast of Ostend. It has a peculiar stratified appearance in some samples, whilst others are more compact; it is of a grey tint, contains fragments of peak, and recent shells, such as *Cordium edule*, *Mya rugosa*, &c. in a fossil state. A rock very similar in appearance is preserved in the magnificent collection of the *Jardin des Plantes*, of Paris. It is known as *Beauchamp sandstone*, contains both marine and fresh-water shells, and was discovered in the department of the Seine and Oise. M. Phipson having received from Ostend a certain number of specimens of the newly-formed rock on the coast of Flanders, has submitted this rock to analysis, and found it to contain :—

Water, organic matter	2·5
Sand ... 57·0 / Grey clay ... 6·4	63·4
Carbonate of lime	30·8
Peroxide of iron	1·6
Magnesia (small quantity) / Phosphate of lime (*id.*) / Alumina ... (*id.*)	1·7
	100·0

It is a curious fact that the well-known crystals of Fontainebleau sandstone, which have lately been analysed by my friend M. Pizani, contain also about 30 per cent. of carbonate of lime, and 60 per cent. of sand. These facts show us that in Nature 30 parts of carbonate of lime are sufficient to agglomerate double their weight of sand, &c.

A French periodical* is giving a series of articles under the title, "Scientific Works of His Majesty Napoleon III." The most important of these is, perhaps, the work entitled "*Passé et Avenir de l'Artillerie*" (Past and Future of Artillery), which, unfortunately, has never been completed. The author treats of the history of fire-arms from the period of their origin in the commencement of the fourteenth century, and follows their rise and progress up to the time of Louis XIV. H.M. Napoleon III. has shown in this and in his other writings that he is perfectly familiar with the science of mechanics, physics, chemistry, &c. "It has not been my intention," he says in his preface, "to write a novel, but a conscientious history; and whilst studying *con amore (avec amour)* artillery in its origin and effects, I have endeavoured not to exaggerate the results it has produced. To undertake such a lengthy work, I was stimulated by a powerful motive: the love of study and of historical truth. I therefore address my work to all those who love science and history."

* *La Science pour Tous*, Paris. The articles in question are written, and in a very able manner, by M. Leopold Giraud. The first of the series appeared on the 8th September last.

THROUGH JAPAN WITH A CAMERA.*

(*From our own Correspondent.*)

I MENTIONED just now that I had remarked numerous fissures or cracks in the side of the hill as we were ascending it, which I supposed to be superficial, and which I attributed to the heat of the sun. It appears, however, that I must have been in error, and that these fissures extended to the interior of the hill, for from each of them a pale blue flame was rising similar in appearance to what I had seen more than once in marshy grounds in Holland, but burning with a steadier glare. Every now and then a flame would appear to sink into the ground and disappear, to rise as suddenly a yard or two distant. The side of the hill we were approaching was covered with these lights, and formed one of the prettiest and most extraordinary spectacles I ever met with. Whether Dsetjuma was accustomed to such sights, and so cared little for them, I cannot say, but certainly he was the first to remark, that if the men had remained on the hill all our things would have been burnt. I had not thought of this before—I had been too much absorbed in looking at a spectacle so unusual to remember that we had left the camera and the other apparatus on the summit. We hastened round the hill as fast as we could, in the hope that we might be able to find a place where it would be possible to ascend it without danger; but though it was easy enough to trace a way to the top, by which the flames could be avoided, there was always the risk of a flame bursting out unexpectedly beneath our feet. We naturally thought that the men, on seeing these lights bursting out around them, had descended the hill, and were waiting for us close by; but all our attempts to find them were without success. We shouted until we were hoarse, but all to no purpose. Matters were now becoming serious, for there could be no doubt that, if the men had come down, they would have remained close by until we returned; and I, for my part, became greatly alarmed, as minute after minute went by and still we got no sign of them. Dsetjuma suggested that, in all probability, they had laid down as soon as we left them and gone to sleep, and that it was not at all unlikely that they might be asleep there still, and if so, were most likely stifled, or would be before morning. As it is not very difficult to bear the misfortunes of strangers whom it is not in our power to assist, it is possible that I might have returned resignedly to the village if I could have been assured that this had already taken place; but, while there was a doubt on the subject, this was impossible. I first suggested to Dsetjuma that the hunchback might try to make his way up; but no doubt a hunchback sets as much value on his life as an upright individual, notwithstanding the disadvantages under which he labours—at all events, this one did, and when it was proposed to him he seemed very much offended, and taking the two young women, one in each hand, marched off with them. Neither his anger nor the way in which he had shown it was a thing to notice at that moment, when we were thinking of a matter so much more important, consequently, we scarcely noticed that he had left us, but gave ourselves up to a serious examination of the sides of the hill, to ascertain if there were not a way by which we might venture up without very serious risk. At

* Continued from vol. iii. p. 105.

last we found, by steadily watching one side of the hill, which appeared to us to be most free from flame, that the flames did not appear and disappear here as we had noticed on other parts, but still they did so sufficiently to make the ascent one of danger; however, it was impossible to bear this state of suspense, so, belting up my robes, and rolling a quantity of a creeping plant, which grew in great profusion on the spot, round my feet and legs, I commenced my way up. The flames did not rise to a height of more than six or eight inches, and I was very glad to find that they were not so close together as I had imagined, so that I did not in reality incur so much risk as I had anticipated; nevertheless, there was always the fear that something dreadful might happen at any moment which might cause my destruction—in short, there was the fear of the unknown.

I dare say I was not long in getting to the top, though it seemed a long time to me, and, on reaching it, I looked first at the crater, expecting to see flames bursting forth, but there were none visible, and no more sign of its being alive than I had already seen; neither were there any flames rising from the surrounding surface, though the smell which I had noticed, when taking the negatives, was still very perceptible.

The change from the light I had been looking at prevented me from distinguishing objects in the comparative darkness in which I was now surrounded, so that I could not, at first, see whether the man I was looking for remained on the summit or not, but, on my eye becoming a little more used to the situation, I saw some dark objects quite on the opposite side, and to these I hastened, in the full conviction that they were the individuals of whom I was in search, and, to my great consolation, I was not disappointed. They had packed the tent and other things in the palanquin, which we had not ourselves placed there, and then, as Dsetjuma had imagined, they had lain down to get some sleep, after the fatigues of the day; and, most probably, there they would have remained sleeping until the next morning, if I had not aroused them, which I did in no very gentle manner. I made them comprehend that they were to follow me with the palanquin, and I led them across to the point where I had ascended, but as soon as they saw the little flames, scattered here and there, they seemed filled with consternation, and it was some minutes before they could summon up resolution to make the descent. What I most feared was, that if they were burnt they would drop the palanquin and make a desperate rush to save themselves.

To avoid this, I took hold of the fore part of it myself, and so prevented them from going too fast, and either breaking the bottles or glass plates, or dropping the whole concern. We were about half-way down, when the green plant which I had wound round one of my legs suddenly dropped off, and at that very instant one of the flames darted towards it, as if it were a living being. My first impulse was to cry out with the pain; but, when the sudden surprise was over, I found that I was not burnt, and was not even conscious of any pain. I approached one of the flames, but it moved away from me, and, as I pursued it, flickered and went out. I tried another, moving very gently and slowly, and succeeded in getting my hand near enough to satisfy myself that the flame was without heat, or nearly so, and I no longer hesitated to pass my hand quite through it, and found, on doing so, that it only communicated a slight sensation of warmth to the skin, so that all my alarm had been without cause, and I was even disposed to doubt whether, instead of smoke, it was not steam which was issuing from the summit of the hill.

(I may as well mention here that we passed this hill some weeks afterwards on our return, and after nightfall I rode over to inspect these lights more closely, with a view to discovering their nature, if possible; but not a single light was visible. I waited there upwards of an hour, and finding that none appeared I rode back again. I am not sufficiently versed in such subjects to venture an opinion as to the origin of this light. Its nature I presume to be the same as the *ignis fatuus*, but I never remember to have read that this gas is found anywhere except in marshy places. I made what inquiries I could through Dsetjuma, but none of those to whom he spoke on the subject had seen it, except at rare intervals. The only antecedent fact which might be presumed to have some connection with the phenomenon was that there had been, two or three days before we visited it, a heavy fall of rain.)

(*To be continued.*)

NOTES OF A DRY COLLODION TOUR.

To the Editor of "THE PHOTOGRAPHIC NEWS."

SIR,—Having received a great deal of information at various times from correspondents' letters in your paper, I am induced to send you the following notes of a photographic ramble, in the hope that some part of it may be useful to my brother amateurs.

Being charmed by the account given by "R. A. W." of the scenery of the Wye, I determined to pay the scenes of his labours a visit. Before starting, I prepared about four dozen stereo. plates, part by Fothergill's, and part by Long's gelatine process. Starting from London, I first went to Bristol, but did not see in this town anything to tempt me to expose any plates, although, to a wet collodionist, some nice views could be had of the ancient church of St. Mary Redcliffe (now in course of restoration), if he began early in the morning, before many persons were about. Going on to Clifton I found many beautiful bits of scenery, and exposed several plates. Leaving here in a steamer, I proceeded to Chepstow, and exposed several plates on the Castle, &c. From thence I went to Tintern Abbey, and here is a rich mine for an amateur photographer. I exposed some two dozen plates in this building, and then left it with reluctance. Then to Monmouth, which does not present any attractions to a photographer. Stopping here for a day or two, I took the opportunity to visit Raglan Castle; and, being more fortunate than "R. A. W.," in the weather, I exposed the greater part of my remaining stock of plates. From thence to Ross, which possesses no objects of photographic interest; then returned home. On developing my plates, I found Fothergill's much superior to Long's process; but, unfortunately, my plates are most of them covered with large insensitive patches, upon which I could not develop any picture, although liberal with nitrate of silver in developer, and other parts of the picture came out strong. I was extremely careful in the washing and applying the albumen. In preparing some with gum water and chloride of ammonium, although I used a very weak solution, my plates were covered with blisters, exactly as "S. S. B.," vol. ii., page 263, mentions. On testing the solution of gum water, I found it to be strongly acid to litmus paper; I then added liquid ammonia to it, and found the blisters did not appear. The blisters appeared when albumen was used with the chloride of ammonium, until liquid ammonium was added. I have always found the film, when gelatine is used as a preservative, extremely liable to wash off or float away in developing. Through these mishaps, my stock of negatives is considerably reduced. I should advise any persons going this excursion to take the necessary materials to work wet collodion, as the beauty of many of the views depends entirely on the trees, &c., which I find extremely difficult to render properly by any dry process.

Admittance to Chepstow and Raglan Castles and Tintern Abbey is granted on payment of sixpence each person; and I can assure your readers that they will meet with every courtesy from the custodians. I may mention particularly the keeper of Tintern Abbey, who showed me a large collection of stereograms to guide me in the choice of spots to plant my camera. When admitted, you are not followed by any annoyance, in the shape of a guide, as you are in some places, but are allowed to walk freely about; and, there being many quiet, sheltered nooks, suitable for the erection of that startling object, a photographic *tent*, or

whatever name the owner pleases to call it by, I shall, next time, take my wet collodion apparatus. Although much depreciated by effeminate photographers from the weight of the apparatus, I think that this disadvantage is more than balanced by the *certainty* that you have the picture of a selected spot before leaving it. Now, in working *any* dry process you are in doubt till you have the opportunity of developing your plate, and, perhaps, finding it a total failure when hundreds of miles away from the scene.

Hoping that others of the craft may send notes of their rambles, giving particulars of how to get admission to ruins, or other interesting places, I am, &c., J. N.

Proceedings of Societies.

Manchester Photographic Society.

The annual meeting was held on the 2nd inst., at the house of the Literary and Philosophical Society—J. Sidebotham, Esq., presiding.

Mr. Mann, the honorary secretary, read the annual report, in which it was stated that the funds of the society were in a flourishing condition, the treasurer having a considerable balance in hand. There was a short review of the papers read during the last session, the meetings of which were well attended, and of a highly interesting character, and the society's portfolio had been enriched with many beautiful specimens, the production of members.

The Council and officers were then elected for the ensuing session. *President*, The Lord Bishop of Manchester. *Vice-Presidents*, J. B. Dancer; James Prescott Joule; Arthur Neild; H. E. Roscoe; Joseph Sidebotham; W. C. Williamson. *Other Members of Council*, J. Compton, Jun.; Samuel Cottam; J. Dale; J. Dorrington; G. Higgins; G. T. Lund; T. Mabley; James Mudd; T. H. Nevill; A. Patterson; John Parry; J. J. Pyne; F. Tobler; H. Young; S. W. Williamson; G. Wardley. *Treasurer*, Edwyn Offer. *Honorary Secretary*, Edward Mann.

The evenings of meeting for the ensuing session were fixed for the first Wednesday in each month, from December, 1859, to May, 1860, inclusive.

The thanks of the society were then voted to the retiring officers for their services.

The subscription was reduced to members already in the society, any new ones paying an entrance fee.

One of Mr. Sutton's new triplet combinations was exhibited. It had been carefully tested by one of the members, who gave a very unfavourable report upon it; the smallness of field, want of light, and deficiency of sharpness, were thought to outweigh the advantages offered.

After some remarks on this and other combinations of lenses, the proceedings terminated with a vote of thanks to the Chairman.

Miscellaneous.

THE PHOTOGRAPHIC NEWS ALMANAC FOR 1860.

The extensive sale which the Photographic News Almanac met with last year, proved that our opinion, as to the want of such a publication, was correct. Though it was not produced until late in the year, and long after all other Almanacs had been before the public, the first edition was disposed of within a very few days after publication, and it was found necessary to print a second edition; and this, notwithstanding another Photographic Almanac had been brought out to compete with it. This year it will have no competitor, the Photographic Almanac having been incorporated with the Photographic News Almanac, which is consequently enlarged, so as to admit of the introduction of much additional matter, which the want of space prevented our inserting last year; so that we have no hesitation in saying that it is by far the most useful Almanac which the photographer can possess, as it not only contains nearly everything which constitutes the value of any other Almanac, but likewise matter of peculiar interest to photographers alone. Thus the photographer is able to see, at a glance, the days on which the different Photographic Societies throughout the kingdom hold their Meetings; what discoveries have been made during that portion of the year 1859 which had elapsed when the Almanac was sent to press; and in short, we believe there is no information of the least interest to him, as a photographer, which he will not find in its pages; at all events, we are conscious that we have spared no pains to produce a Photographic Almanac which shall contain everything that could, by any possibility, be useful or interesting to him. With this brief notice, we recommend it to the attention of those who did us the honour to subscribe on its first appearance, and to the general body of photographers.

Manuel Johnson, but yesterday the Radcliffe observer at Oxford, established at that observatory, which he raised to so high a place among the observatories of the world, a complete series of meteorological records. These records were continuous and automaton. Clockwork kept a sheet of paper constantly moving behind each meteorological instrument, and as it moved a lamp threw on it a column of light. The length of that column constantly changed; and an inspection of the instrument would show that that change was really caused by the variation of length, it may be in the mercurial column of the barometer, or of the thermometer, or it might arise from a change in the humidity in the air, in the direction of the ever-vacillating gusts of the wind, or in the wind's force. Thus there were constantly, day and night, a series of long slips of paper on which these shadows were thrown, and which silently, surely, and with no visible change on the paper itself, passed regularly on, each succeeding part of the paper receiving that image as it varied with the successive moments of time. But that fleeting shadow had left its impress there; for the paper was photographically prepared, and needed only development to yield a permanent and infallible record of the changes in the particular atmospheric movement which it was destined to perpetuate.—*National Review*.

Panoramic Lenses.—In a brief notice of a pamphlet by M. Porro we referred to a lens which he had invented for taking panoramic pictures. We offered no opinion as to the value of the invention, as we have had no opportunity of testing it practically nor of seeing it tested, but that it is really useful may be assumed from the fact that it has actually been in use for some time in the Sardinian army, the corps of engineers having employed it in taking surveys of the country previous to the recent war in Italy; at least, so we are assured by advices which have reached us from the Continent. Mr. Sutton, who has just patented a panoramic lens in this country, says of M. Porro's lens that it has all the evils of ordinary view lenses, viz., it allows of oblique incidences upon the internal surfaces of the combination, and it does not give equality of illumination; that the marginal definition is inferior to that in the centre of the picture, and there is not half the amount of light at the sides that there is in the centre; and that the combination produces a considerable amount of "false light." Whether this peremptory opinion of Mr. Sutton's is grounded on theory simply or on an inspection of what the instrument has accomplished, he does not inform us; we are, however, disposed to think it is based on theoretical considerations, and shall therefore wait until we see what either can do before we accept his assertion of the great superiority of his lens over the other. It is but doing him justice, however, to say that he has a high reputation in such matters, and that it is favourable to his estimate of the qualities of the Porro panoramic lens that, so far as we can ascertain, it has not been adopted in the French army nor by French photographers, who, as a rule, are very eager in the adoption of novelties.

Photographic Notes and Queries.

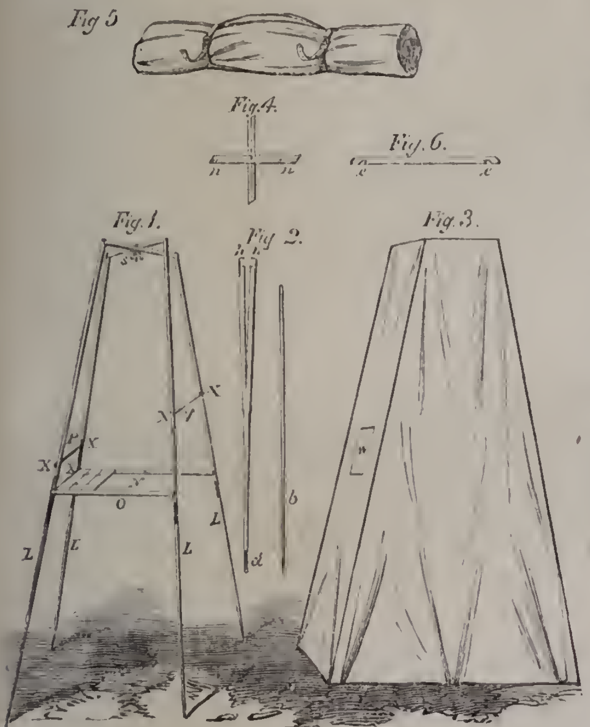
PORTABLE TENT.

Sir,—Having tried some of the *dry processes*, but not, however, with the success of a Woodward or a Sidebotham, I at length determined to have a "plunge" into the wet; and as, in this process, a good portable tent is the *sine qua non* of success, I set about to contrive one myself. All those previously described in the "Photographic News," I considered defective in more points than one—the aristocratic-looking "barrow," it is plain, would be worse than

useless in many of the peregrinations of the photographer; while others, though entitled to the designation "portable," could not possibly afford "elbow-room" within their limited capacities.

The annexed is a sketch of the one in question I designed and executed myself, and though I will not say it is free from defect, yet it possesses the following characteristics:—

1. It is roomy—measuring 7 feet in height and 18 in circumference at the base; so that the largest plates can, with ease, be manipulated within it. 2. It occupies little time in "pitching"—five minutes being sufficient to put it up or take it down. And 3. It is portable—weighing only 13 pounds when packed up (fig. 5).



Description.—The framework or legs, L L L L, consist of eight rounded deal rods, ⅞ of an inch in diameter, joined together in the middle by means of four brass hoops, each 3 inches long; these hoops are fastened on the lower extremities of the upper part of the legs, *a* (fig. 2), and when about to be joined, the lower part of the leg *b* (fig. 2) is pushed into the hoops after the manner of putting together a fishing rod. The upper half of each leg is square, and left stronger than the remaining portion A (fig. 2); this is necessary, as it has subsequently to be slit down with a saw to 18 or 20 inches from the top (fig. 2). On each side, at the top, is screwed an iron plate; through these are riveted the iron pins *p p* (fig. 2), ¼ of an inch long. The tent top (fig. 4) consists of two pieces of deal, 20 inches long, 1 inch broad, and ¾ thick, fastened together in the middle with a bolt and thumb-nut *s* (fig. 1). On each side, and near the extremities, are bored holes, *h h*, to receive the pins *p p* (fig. 2); thus forming a movable joint. It is well to have the holes in question protected by thin iron plates, to prevent the possibility of their being torn out. To the legs (fig. 1) are attached the *stays* P O N V, by means of brass-headed thumb-screws (obtainable of any ironmonger) passing through each leg at *x x x x x x*. To save the trouble of taking out these screws each time the tent is set up or taken down, the *stays* have each a slit cut in place of a hole near their ends *e e* (fig. 6), to receive the body of the screw, which now only requires tightening up, and the whole framework is rendered perfectly rigid. Upon the stays O N rests the operating bench B—a board 3 feet long and 1 foot broad, divided into three parts and hinged together. It is secured to the stays by two brass hooks and eyes, the stay P being placed at a convenient height above the operating bench serves to rest the plate against to drain. The cover is composed of two thicknesses of yellow calico and one of black; round the bottom are sewn twelve brass rings—three on each side; through each a peg can be pushed into the ground; thus giving security to the tent in case of wind, and preventing the ingress of white light. It is entered on the side opposite the operating bench, over which is the yellow light W (fig. 3). R. Mason.

PATENTS FOR BI-COLOURED STEREOGRAMS.

Sir,—Permit me to assure Mr. "R. Harmer" that I have no desire to fall "foul of a patent" myself, or to instigate any of your readers to commit so dire an offence. I must plead ignorance of the existence of his patent for colouring stereograms in "contrast colours:" what I related was the result of my own experiments, and I made it public, through your excellent journal, from the feeling that all should add their quota to the general stock of science; and, remembering what would have been the result, had the discoverer of the collodion practice of photography obtained a patent for his renowned process, I did not dream of putting a lock upon my supposed discovery, though I saw that it might be turned to some commercial benefit.

I am pronounced to be in error when I state, that, on the union of two forms of different colours, a new colour is produced. This is hypercritical. "R. Harmer" says they "do not mix, but are blended," which means much the same as my own statement. I believe both of us are right. It is not in the nature of the experiment to expect a steady, permanent colour, because of the differing powers of the two eyes and the manner in which the light may be reflected, causing the one or the other colour to be dominant. But I hesitate not to say, that if the powers of the eyes are balanced and sustained, the light evenly diffused, and the colours uniformly spread, that a genuine colour will be the result.

In nature we have only the three primary colours, and it is probable, that when any object appears of a secondary colour, it is caused by the power of the elementary molecules of the substance—which in all cases, excepting of course the simple bodies, are of more than *one* kind—to absorb and reflect different portions of the constituent colours of solar light, which are blended into one colour by the eye receiving the reflection, and by this stereoscopic experiment we obtain, as it were, an analysis, or rather a proof by synthesis, of the way in which the different colours of objects are produced and combined. Nemo.

PATENTS FOR BI-COLOURED STEREOGRAMS.

Sir,—A correspondent, in your last week's issue, remarks that "there is nothing new" in "Nemo's" communication, regarding the mingling of colours in the stereoscope, as he (your correspondent) obtained a patent for colouring stereograms, in opposite colours, in November, 1856.

If I rightly understand your correspondent, that his patent was simply for the use of different colours on the same part of each half of the stereogram, so that such colours should blend in the stereoscope, producing, in draperies, &c., a shot effect, it may interest some of your readers to know that there was "nothing new" in such patent even in November, 1856, as I coloured and issued stereoscopic portraits, on the same principle, as early as 1853; and, if I remember rightly, some of my professional friends did the same about the same period.

If prior publication invalidate a patent, as I believe it does, your readers, who are anxious to experiment in this direction, may do so without any fear of "falling foul of a patent."

G. Wharton Simpson.

IS OXYGEN COMBUSTIBLE?

Sir,—In your article on chemistry, it is said of oxygen, "that it supports, though is itself incapable of combustion." Now, I cannot view it in that way. What is combustion? Light and heat, the effect of rapid combination; in the case of a jar of hydrogen, for instance, after the light is applied combustion takes place only at the part where the two gases (oxygen and hydrogen) combine. Why, then, say that hydrogen is a combustible and oxygen a supporter of combustion, when the effect is produced equally by both? It may be said that the air is not set on fire; that part of it which comes in contact with the hydrogen does take fire, and at no other part of the hydrogen but that which is in direct combination with the oxygen is there any combustion. Let us suppose that the atmosphere were hydrogen, we should have the same effect produced with a jar of oxygen as in the present case with the jar of hydrogen. The hydrogen atmosphere would not take fire but at those parts where oxygen was presented. Instead of substances containing carbon and hydrogen for fuel, those containing a large quantity of oxygen, or other things having an affinity for hydrogen, would be the most combustible. Our gas pipes would have to be supplied with oxygen, which, when ignited, would combine with the hydrogen, producing light and heat at the burner. Would it not be better, then, to say, oxygen combines with many substances, *producing* combustion.

J. W. Robson.

[In all popular descriptions of scientific subjects, it is necessary to employ language which will be easily understood; and in saying that oxygen was "a supporter of combustion, although not combustible itself," we were strictly correct, both in a scientific and common-sense point of view. The language of chemistry must be based upon the physical conditions which govern the pursuit of that science, and the fact that oxygen would be classed amongst combustible bodies by the chemical students in some other planet which was surrounded by an atmosphere of hydrogen, can make no difference to us oxygen-breathing chemists.—Ed.]

CLEANING OIL PAINTINGS.

Sir,—In answer to "Inquirer"—If the picture is not cracked, is simply dirty from dust and atmospheric impurities, a little peameal and water well rubbed over the picture, then wiped with a damp cloth, and finally rubbed dry with an old silk pocket-handkerchief, is enough to clean it. If the picture is discoloured by varnish, the character of the varnish will determine the means of removal. Mastic varnish can be removed by dry friction with the fingers, or by spirit of wine mixed with turpentine; shake well together, and apply with a pellet of cotton wool—taking care not to *remove the paint*. If varnished with copal or boiled oil, or some continental varnishes, an alkali is used, but with the greatest caution.

Cleaning a picture had better be done by a person whose business it is. Amateur cleaning is generally destruction. I should advise all persons most earnestly not to meddle with such matters. If the picture is of value, it is foolish to risk its destruction; if a bad one, it is loss of time. Though an artist, and conversant with modes of cleaning, I should always put a picture I valued into the hands of a professional cleaner, who works with intelligence.

An Artist and Photographer.

CLEANING GLASS PLATES.—PUTTY FOR CEMENTING GLASS.

Sir,—Permit me to add two facts that photographers may find useful:—

1. That peameal or oatmeal, with water, is admirable for cleaning photographic glasses.

2. That if glass, for operating rooms, is put in with genuine putty—*i. e.*, made with linseed oil and whiting only—the frequent annoyance of rain coming in would be entirely obviated, especially if the edges of the glass be roughed or ground; the older it is the harder and tougher it is. The commercial putty is generally half water, and frequently two-thirds; such stuff is soon rotten, falls away, and leads to no end of mischief and vexation.

An Artist and Photographer.

TO CORRESPONDENTS.

T. B. D.—1. If four stamps are sent to our office, the required number of the "Photographic News" will be forwarded. 2. The size of a picture which any given landscape lens will take, will be such that the greatest extent covered (measured diagonally from opposite corners) will be about three-fourths the focal length. This is, however, only an approximate rule, some lenses being able to cover a field sharp, whose greatest measure equals the focal length; whilst some, on the contrary, are just the reverse, and require a focal length about double the character of the picture covered. The English make of view lens is usually preferred, although we have seen some very excellent pictures taken with foreign lenses.

H. R. R.—Your communications and pictures have arrived safely, for which accept our thanks. No. 1 picture is not very good, the process is, we think, at fault, as there is great want of half tone. No. 2 has plenty of half tone, but is so much out of focus, that the beauty is destroyed; the process seems very good. Nos. 3, 4, 5, 8, are very good pictures. We shall have great pleasure in inserting your name in the next list.

T. T.—The following is a good receipt for preparing oxymel for photographic purposes:—Take one pound of honey, eleven drachms of Beaufoy's acetic acid *fortiss.* and thirteen drachms of wator; place the vessel containing the honey in boiling water, and remove the scum which rises to the surface; this must be done two or three times; when add the acetic acid and water, strain, and preserve for use.

Trotting.—We do not think it will be advisable to use an old collodion nitrate bath for the waxed paper process, even if the proper quantity of acetic acid is added to it, as you will run great risk of getting the peculiar marble-like stains, so common with some operators, on this beautiful process, and which we think are due entirely to want of proper precautions as regards cleanliness and purity of the materials employed.

A. B.—From the appearance of the picture, we should say the bath required filtering; the collodion being turbid might also account for some of the spots. The pictures are neither of them good ones, and show many faults which more experience will enable "A. B." to overcome. The author of the book you say you are studying will, we believe, teach the art.

J. C.—You were in error in using English paper, the sizeing of this paper not being suitable for the waxed paper processes. Had you used French paper, you would doubtless have succeeded. Your *axiom* is not correct, as the waxed-paper process has been worked with excellent results when the thermometer was below zero.

Optic.—The fault you mention is not uncommon with some lenses, and arises from an irregular reflection of light, either from part of the lens itself, or some part of the brasswork. Point the lens and camera to a view, and remove the ground glass; now, on looking in from behind, some shining points about the lens will most likely be seen which causes the foggy spot.

J. Beldon.—The prints are not so good as some we have seen, but still they are equal to the average of "club" pictures—your name shall be inserted. We shall be glad to hear of your success. Our plates are dried in a tin box, so constructed that it may be heated by gas, and, at the same time, have a free current of air through it.

Delta.—We gladly insert your note. We hardly think the specimens are as yet good enough for the club; but in a little time you will, doubtless, be able to join. The negatives are very good, with one or two exceptions, but the printing is bad. You will meet with better results if you follow the plan recommended by "O" in No. 28 of the "Photographic News."

Delta (G. T. J.)—You have quite ruined your bath, and can do nothing now but precipitate the silver from it, and reconvert it into nitrate, as recommended in former numbers.

Beginner.—We are not aware of the exact composition of the alkaline toning-bath referred to, but in our second volume, p. 16, will be found an alkaline toning-bath, which will give very similar results.

F. S. Beatty.—Your photoglyphic engraving on copper has arrived quite safely, and is now in the hands of Mr. Brooker, who is printing off some proofs.

J. P. T.—Consult the price list of some optician; the addresses of several will be found in our advertising columns, and on application they will, doubtless, forward you a price list.

Sam Slick.—1. A single lens will be superior to a double combination for taking views. 2. Thin French or German paper.

T. J. Adams.—An account of gum dammar will be found in our second volume, p. 173.

E. Lewis.—Some of the slides are sufficiently good, but the others are very inferior.

F. M. G.—You can have the missing number by sending four stamps to our office. They are both very excellent books.

J. P. S.—The pictures are very good, and your name shall be inserted in our next list.

Solar.—The pictures have all the faults of indistinctness and foggy outline, which are inseparable from positives enlarged from small negatives.

J. Mc.—See the article on the positive collodion process, given in our last number.

H. N. King.—The varnish has arrived; we will try it.

G. C., Jun.—It is not unlikely that the proposed plan will be followed.

Communications declined with thanks.—P. Y. R.—Oats.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—A. W. W.—F. L. D. L.—Pyrrhus.—K. E. R.

In Type:—G. H. W.—B. M. Brackenridge.—M. A. Root.—Wide Awake.—H. R. R.—Samuel Fry.—Amateur.—Jos. Bell.—J. Walter.—W. B. B.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 63.—November 18, 1859.

THE ESTABLISHMENT OF AN UNIVERSAL COLLECTION OF ENGRAVED AND PHOTOGRAPHED PORTRAITS.

The activity of the last thirty years in various departments of enterprise has been so great that it would seem almost impossible to find fresh opportunities for exertion. Still, this is not the case, and continually new plans and schemes open upon the human mind, to afford it activity and nourishment. Amongst these, the plan of establishing an universal collection of historical portraits is not the least. The projectors of the Crystal Palace at Sydenham have carried out a similar idea in a very excellent manner, and their collection of *busts* exhibits (notwithstanding a few omissions) one of the finest ever placed before any nation in the world. An universal collection of engraved and photographed portraits would possess, perhaps, a still wider bearing.

Of the ancients, we possess, as a matter of course, only busts and portraits as they were made by the sculptor and *medailleur*. But most of them have been engraved in works which bear the stamp of excellence, and can, therefore, not be lost or dispersed. This is, however, not the case with the portraits engraved since the invention of that art in Holland and Germany. Since that period, every year has brought forth a vast number of portraits of every kind, and of all sorts of persons. The print room of the National Library of Paris and of the British Museum, London, possess valuable collections of such portraits.

If ever the plan of forming an universal collection of engraved, photographed, and miniature portraits should be accomplished, a great desideratum of literary, scientific, and art history will have been attained. It has often happened that persons little known during their lifetime have risen to great eminence after death. We should think that some portraits of Columbus might have been engraved during his lifetime; but where are they now? Of Spinoza, who lived still later, no authentic portrait is known, although it is likely that, even on account of his notoriety, engraved portraits of him must have existed. Owing to this and many other considerations, genealogical, heraldic, &c., an universal collection, such as we have mentioned, becomes desirable. But it is astonishing what numbers of portraits have been published since the invention of typography, and we may conjecture, that amongst every batch of *five* books published, from the largest folio to the slightest tract, there is *one* with portraits. Speaking of the Continent, there is no reigning nor noble family, no order of chivalry, no great convent, no episcopal see, nor university, &c., of which volumes of folios of history, and biography, and genealogy have not been published, every one of them containing numerous portraits, besides the great number of authenticated portraits in oil colours, &c.

But an universal collection of portraits could never have been attempted without the aid of photography; for some of the prints are either of excessive rarity and not to be obtained but at a high price and on rare occasions, or they are often contained in books, the disseverment of which for the sake of one or a few portraits, would not be expedient. Here *Helio's* new art comes into use, and affords us not copies of *dubious* authenticity, but of perfect identity. We hardly need say, that the same refers to miniatures and oil paintings, some of which do not exist but in one single copy. Here, therefore, photography becomes a most important helpmate of history, art, literature, &c.

The question next to be solved is, what description of portraits ought to be admitted into such a collection? As far as engravings are concerned, it appears to us, that every portrait, or group of portraits, to which there is a *name* attached, ought to be included in such a collection, *whether* the name appertains to the person represented, or to the engraver. Although we call the proposed collections *universal*, yet it is not to be assumed that every one thus formed will contain the same number and specimens of portraits. This would be impossible; besides, it runs counter to that *popularisation* of arts and sciences, on the threshold of which we are now standing. Partial as we are to the *British* Museum, we think that its vast income alone would be able to bear such additional expense. An universal collection of portraits made at Liverpool, or Edinburgh, or Dublin, will, as a matter of course, be most complete in the worthies of these towns respectively. It is very natural that an universal collection formed at Madrid, would, *ipso jure*, contain a larger series of original portraits of Columbus and the other *conquistadores* of America. This holds good in any especial case, and for every especial collection.

A few supplementary questions are yet to be resolved: one applies to the *catalogues* of such collections. We do not speak of the catalogues, made by *private contract*, in which apparent completeness runs into absolute confusion, but rather those of the oldest public libraries of Europe, such as are to be found in Vienna, Berlin, &c., where two or three scores of large folios constitute the whole material of reference. A catalogue of a collection as proposed, ought, and must be still a double one—one for the names of the *portraitees*, and the other for the engravers, painters, and photographers. In the former set, we should find alphabetically arranged the names of all persons whose portrait or portraits are in the collection; in the other set, the names of all artists by whom portraits are taken or engraved. M. Blanc of the print room of the Paris National Collection has published a *catalogue raisonné* of prints, to which most useful and admirably-compiled work we may call the attention of English amateurs and others interested.

We cannot let this occasion pass without speaking of the photographed portrait. When Faust and Guttenberg first sold their printed books as MSS. (then said to be made by the evil spirit), no one could have thought of the moral and ethical results of typography—but they came, *bongré, malgré*. Hitherto, the portrait painters could flatter a *little*, but the sun cannot be brought to that pitch of complacency: hence, therefore, a photographed portrait is a very *explicit* historical document—a subject on which we shall not dilate here; still, it will be at matter of much study and reflection at a future time. Although the art of portrait painting has been extensively practised and patronised there have, within the last century, been hardly half-a-dozen or so who have reached European notoriety. Such were Thomas Lawrence, Isabey, Gérard, and a few others. It has been said that Sir Thomas idealised his sitters too much. We do not think so. We

once had an opportunity to sit for a long time before the collection of portraits of the Kemble family made by the above painter. Comparing the portraits of the great John Kemble and Mrs. Siddons with those made by other masters, it appeared to us that Lawrence only seized upon the best expression with such persons as Kemble and his sister in the moments of excitement, or inspiration. The same ought to be done by the photographer, as with historical personages it becomes matter of some consequence. It is astonishing to think how many persons now attain in the fine arts a high degree of *efficiency*, and yet have not the tact and courage to make the necessary effort to attain perfection.

The tact to take a portrait *par excellence*, is matter of consideration, and may be briefly stated here. Such a portrait ought to represent a person in his *average* best mood, at whatever period of life it might have been taken. It is equally wrong to represent a person as he or she appears but *seldom*, as it is to represent a person to the worst advantage. In the historical portrait this is paramount, as History may draw her *conclusions* from the physiognomic data of such portraits, and her judgment is mostly just, and often severe. Thus, Lavater, in his "Physiognomic Fragments," a work most famous in his time, passed a real *last judgment* on people dead and alive. And what are Lavater's portraits compared with those of heliography, where we perceive in the face of a great statesman even his habit of keeping bad razors, and shaving only very *loosely?*

Thus, we think we have sketched sufficiently the expediency of establishing, at the print room of the British Museum, an universal collection of engraved, miniature, and photographed portraits, so that any one wanting to know what portraits, if any, exist of a certain person, may find it by a glance at the catalogue. We need hardly add, that of some people, for instance, Byron, Napoleon, Cromwell, Washington, there are hundreds of portraits, which would necessitate a certain clever sub-arrangement of the catalogue—subjects of detail, &c., unnecessary to be broached here.

PHOTOGRAPHIC VARNISHES.

The members of the French Photographic Society, in addition to their regular business meeting held once a month, are in the habit of assembling once a week in the society's rooms for social conversation, somewhat after the manner of a club. An attempt was made to induce the members of the London Society to adopt a similar practice; newspapers and scientific periodicals were laid on the table for their use in a room comfortably fitted up, but the attempt proved abortive. English photographers appear to prefer their own fireside to any more extended communication with their brethren in the art than is involved in meeting them once a month, and, indeed, comparatively few, who are members of the society, attend these meetings at all. It is just possible that more advantage would result to photography from these social meetings than from the more formal affair which takes place once a month; at any rate, the conversations between two members of the French Society, M. Mailand and M. Davanne, have led to the former gentleman giving an elaborate account of the method of making varnishes suitable for photographic purposes, which is published in the *Bulletin* of the Society, and from which we extract only so much as appears valuable to photographers.

The resins used may be summed up in the following list; some of those used being soluble in alcohol, others in turpentine, and some few can only be dissolved over an open fire at a temperature of about 300°, and then mixed with boiling linseed oil and certain essences. Among those soluble in alcohol are:—

Benzoin.
Elemi.
Tacamaque or animi.
Sandarac.
Gum lac.
Turpentines or balsams.

Soluble in essence of turpentine—

Soft copal.
Mastic.

In oil and essence over an open fire—

Hard copal.
Half hard copal.
Yellow amber.

The substances which are soluble in essence of turpentine are to a great extent soluble in alcohol; likewise, several of the substances included in the list as being soluble in alcohol, are soluble in essence of turpentine; but it is not advisable to employ it, for sufficient reasons. Camphor and balsam of copaiba are also soluble in both solvents, but they are only used in alcohol varnishes, because, if they were used in those prepared with essences, they would have the effect of making them soft, and too siccative, and even in the former case they must only be used in small quantities. The object of employing these substances at all, is because the addition of a little camphor gives fluidity to the resins, and the balsam of copaiba adds to its stability; but excess of the former will dim the varnish, and an excess of the latter will render it too viscous.

The resins named above possess very different qualities; some of them are hard, others are soft, and others, again, are distinguished as dry. Some would give a brilliant appearance, but would be apt to crack and flake off at the slightest shock, others would grow dull after a short time, and the negative would be spoilt; consequently it is necessary that they should be mixed in such a way as to obtain the greatest amount of brilliancy, hardness, and fluidity. The basis of a hard varnish is gum lac, and the degree of hardness is regulated by the amount of this substance which the varnish contains. It is the infinite number of modifications of which varnishes are susceptible, from the facility with which the different resins we have enumerated combine, that has given rise to the innumerable receipes extant. It should be borne in mind that the purer the alcohol the greater its power as a solvent, which may be still further increased by the addition of chloroform. The use of this substance, however, has the disadvantage of diminishing the transparency of the varnish. It is evident that in choosing resins for making varnish, the great object is to select those which shall produce a substance free from colour, capable of drying quickly, hard, but without a tendency to flake off. The transparency of the varnish used for negatives is a matter of primary importance, as, if it possesses a yellow tinge, which is very commonly the case with varnishes, the passage of the actinic rays is impeded, and the process of printing is lengthened, even if it is interfered with in no other way.

Before we give a translation of the formula, dictated by the experience of M. Mailand, for the preparation of varnishes for photographic purposes, we may mention that, in the case of some resins, it is customary to wash them for a moment in alcohol, in order to free them from some of the impurities with which they are discoloured; also, that Venice turpentine may be kept in a liquified state by dissolving it first in a water bath, and, when the dissolution is complete, adding to it essence of rosemary, in the proportion of one part of the latter to two of the former.

VARNISH FOR POSITIVE PROOFS.—No. 1.

Soft copal	16	parts.
Mastic in tears washed in alcohol ...	15	,,
White elemi	8	,,
Pounded glass	20	,,
Alcohol (40°)...	100	,,
Venice turpentine liquified	8	,,

First put the pounded glass in the vessel, reduce the copal to powder and dissolve it in the water bath, afterwards pass it through a paper filter, crush the mastic and the elemi, put them with the other ingredients, and leave them to dissolve without the aid of lint. If all these resins were

mixed with the alcohol at once, the spirit would seize the more soluble, and would not retain sufficient power to dissolve the copal. The object of adding the pounded glass is simply to prevent the resins from attaching themselves to the bottom of the vessel; and, consequently, to assist the solvent action of the alcohol, it must be stirred, from time to time, to facilitate the solution. When this is quite completed, put in five parts of powdered animal charcoal, and stir it well, and then put it aside until the powder has settled at the bottom, which will be in about a week, when it must be filtered through paper, and, lastly, the Venice turpentine must be added. The object of adding the powdered charcoal is to clarify the varnish.

The next formula yields a very white varnish:—

White gum lac, recently prepared	14 parts.
Soft copal	16 ,,
White elemi	9 ,,
Stearic acid	2 ,,
Pounded glass	20 ,,
Alcohol at 40°	100 ,,
Venice turpentine	8 ,,

Put in the pounded glass first, then the stearic acid, and dissolve it by itself in the water bath, or by exposing it to sunshine. The remainder of the operation is the same as that described above. The Venice turpentine should be added by slow degrees, and well mixed at each addition, otherwise the varnish is likely to become thick.

The next formula gives good results, but the varnish is not quite so free from colour; this, however, would be scarcely perceptible on paper:—

Sandarac washed in alcohol	24 parts.
Elemi	10 ,,
Stearic acid	2 ,,
Pounded glass	25 ,,
Alcohol at 40°	100 ,,
Venice turpentine	10 ,,

The object of using the stearic acid is to give greater pliancy to the varnish; it must be melted in the water bath and the varnish made at once, as the acid is precipitated when the alcohol is below 50°. There is no danger of precipitation, however, when once it is incorporated with the resins. The remainder of the operation is the same as that given for the preceding formula.

These varnishes are fluid and brilliant, and do not communicate a yellow tint to the paper; but they would not be suitable for varnishing negatives, inasmuch as they would be liable to suffer from frequent manipulation. Varnishes for negatives must necessarily be harder, so as to resist the friction to which they are subjected. Gum lac forms the best basis for this kind of varnish, but as it is liable to crack and flake off if used alone, it is advisable to add a little of a tougher kind of resin in order to prevent this; but this addition must be made with care, as otherwise it will be likely to soften under the influence of the solar rays; and the same result will occur if the resins are dissolved in essences, because this substance leaves a tenth of its weight of fatty essence which does not evaporate. The best varnish for negatives which M. Mailand has been able to make was compounded from the following formula:—

Gum lac	12 parts.
Yellow elemi	3 ,,
Pounded glass	10 ,,
Alcohol	100 ,,

Dissolve in the water bath, clarify with animal charcoal, and filter through paper.

This varnish will not be quite transparent, but, says M. Mailand, "I think this an advantage, as it retards the action of the sun's rays, and protects the half-tones." The proportion of resin which this varnish contains is very small, and, if found advisable, the quantity may be slightly increased, but we think it will be best to use the formula as it is written. The addition of from 1 to 2 per cent. of camphor will assist in removing the colour, and will also prevent the varnish from turning yellow by keeping.

The scent which some varnishes possess is due to the presence of some kind of essence which manufacturers add for the purpose of disguising the ingredients of which it is composed.

Recently-made alcohol varnishes are better than those which have been made for a considerable time, as the alcohol evaporates, and the resins themselves are apt to oxidise if exposed to the air, and to colour if exposed to the light.

SUGGESTIONS ON A STANNIC PRINTING PROCESS.

BY JOHN SPILLER, F.C.S., OF THE WAR DEPARTMENT, WOOLWICH.

In reference to a communication which appeared in the "Photographic News" of the 28th ultimo, on "The Conditions affecting the Alteration of Chloride of Silver by Light," some few statements occur which appear to have elicited special remark from several of your correspondents, and upon these points I am desirous of entering into fuller particulars.

The application of the protochloride of tin to exalt the sensitiveness of chloride of silver constitutes the basis of a new printing process, which I had hoped to have been enabled to perfect and communicate in all the details necessary for its successful performance; but, failing in this, I give a *resumé* of the facts already ascertained, and must leave to the experimental ingenuity of your correspondents the realisation of their hopes in regard to the practical employment of such a process.

Firstly, then, it is possible to prepare a paper in which the sensitive material is produced by washes, successively applied, of nitrate of silver and protochloride of tin, a slight excess of the tin-salt having, equally with the free nitrate of silver usually employed, the power of determining the rapid darkening on exposure to sunshine. Such papers, although containing less silver in their composition than those prepared by the ordinary processes, print more rapidly, and assume a deeper shade of colour, approaching to violet. The impressions may be fixed and treated in all respects precisely as ordinary proofs, with the limitation only that it would not be advisable in this instance to employ the chloride of gold *alone* as a toning bath, prior to the application of hyposulphite of soda, since the formation of purple of cassius would be likely to interfere with the successive changes of colour then to be studied. The addition of gold to the fixing bath gives, however, an agreeable variety of tones, which are completely under control.

Thus much said in favour of the employment of tin, it is desirable, in the next place, to point out some of the disadvantages to which a process of this nature seems liable. The protochloride of tin, even when employed in the form of a tolerably dilute solution, and made as neutral as possible, appears, nevertheless, to exert a slight corrosive action on the substance of the paper, rendering it harsh, and affecting it in much the same manner as would diluted acids. The cuticle of the skin also is not proof against this cauterising property. Albumenised paper suffers less during its immersion than plain paper, the pores of which are, undoubtedly, more freely open to the action of the tin solution. It is necessary, on this account, during the preparation of the paper with the protochloride, to remove the great excess of this re-agent by subsequently washing in a more highly dilute solution of the same, and thus to prevent, in some measure, its concentrating in the material of the paper whilst drying. A very trivial amount of the tin-salt seems adequate to impart the necessary degree of sensitiveness to the chloride of silver, and the presence of any more than this small amount is attended with positive disadvantage. Also, it will be found imperative to preserve the paper from the action of the light *in both stages* of its preparation, for if the sheets, after the application of the first wash of nitrate of silver, are allowed to become exposed to light, the next wash with the tin solution will serve but to develop the, perhaps,

hitherto latent impression, as would occur in the exact parallel of Mr. Talbot's process, with iodide of silver.

In the event of these practical difficulties being overcome, it is anticipated that a saving in a large proportion of a valuable metal would follow the employment of a process wherein the necessity for the existence of much silver, in the form of free nitrate, in order to secure the requisite degree of sensitiveness to the chloride of silver, would no longer be demanded.

Chemical Department, Royal Arsenal, Woolwich, November, 1859.

[We would advise those experimentalists who are desirous of making the leading experiments referred to in the above and previously mentioned articles, to prepare for themselves the chloride of tin in preference to purchasing the ordinary crystals, which seldom dissolve to a clear solution, and are then difficult to filter. The preparation is sufficiently simple:—Melt some grain tin, and pour it into water to granulate it; then boil, in a test tube, a little of this granulated tin with concentrated hydrochloric acid, until hydrogen gas is but slowly evolved, taking care to keep the metal in excess. Dilute the solution with, at least, ten times its bulk of water, and preserve for use in a well-stoppered bottle, with metallic tin in contact with it.—Ed.]

Critical Notices.

STEREOGRAMS FROM CHINA.*

CONCLUDING NOTICE.

Everybody, it is to be presumed, knows what a joss house is; but if there are any who do not, we may state that it is a temple devoted to the worship of an idol, or joss—a cheap form of worship, involving little beyond the occasional expenditure of two or three copper coins for a stick of incense, or the exertions of a little manipulatory dexterity with scissors and paper in the operation of cutting out figures of animals, &c., which, being duly offered up before the joss, the god is supposed to take the semblance for the reality, and to give the sacrificer credit for having presented him with a fat ox or horse, as the case may be. The Chinaman is not gifted with any strong religious feelings; his code of morality consists mainly in fine moral sentences, which are always in his mouth, but which have very little influence on his conduct, which is regulated by other considerations. There was a time when it was otherwise, and when tens of thousands of them were sacrificed for their firm adherence to the Christian faith; but circumstances are changed now, and Chinamen, generally, care little for their gods. If the religious feeling was strong among the Chinese, we should regret to see so many of their religious edifices desecrated by being occupied by our soldiers; as it is, we feel indifferent on this point, and regard only the pleasure we derive from an examination of the beautiful representations of them in the stereoscope, which we owe to the enterprise of Messrs. Negretti and Zambra. We have a perspective view of a joss house, and a front view of a joss house; and, finally, one of the joss itself, and the numerous little josses, male and female, who are perched on a shelf, or pole, a little in the background. To begin with the perspective view of the joss house. This picture represents the general appearance of the building, as seen at a short distance from the steps which lead up to the terrace on which it stands. The roof is highly ornamented with all kinds of fantastic figures; and beneath the eaves, and carefully screened from the weather by sloping penthouses, are carvings and bas-reliefs of a kind which induces us to regret that the photographer did not make them the subject of special pictures. On the top of the steps is seated a Chinaman, apparently engaged in the same occupation as the peasant boy in Murillo's celebrated painting; a second figure stands against the door, which, but for the rifle beside it, we should take for a Greek statue in the most primitive of costumes; and a third stands just inside, "bearded like the pard," and dressed in the garb of a naval officer. We next come to the front view of the joss house. Here we have a much sharper picture of the building, and one on which the ornamentation is much more distinct. On each side of the open doorway are carved representations of a procession of tributary princes setting out to visit the Emperor, with elephants, horses, &c.; and on the other side is represented their reception by that potentate. There is a singular effect perceptible in this print: just beside the door there is the appearance of a man in uniform, who looks as if he had been flattened against the wall, and had left only an impression of himself behind. This building is now occupied by the 70th Regiment of Sepoys. The joss of which we have spoken does not inhabit this joss house; it is located in the Buddhist Temple, on Magazine Hill. It represents the Goddess of Fecundity, and is very much in vogue among the female worshippers of Canton. On each side of the figure, a little in the background, are two statues, with Tartar physiognomies, and a very jovial expression of countenance; while a little more in the rear is a crowned female figure, a fac-simile of the statue of Queen Elizabeth in Fleet-street. On the ground before the throne, on which the joss is seated, are arranged a number of pots containing votive offerings of plants, chiefly aloes, whose wretched and withered appearance speaks of the absence of those who at one time tended them. The face of the goddess seems to have a thoughtful expression, but it is bent so low that it appears in deep shadow, and consequently it is not easy to distinguish the features. The attitude is graceful, and the drapery artistically arranged, allowing us to distinguish that the foot is of the natural size, and has not been mutilated in the fashion which has existed for the last few hundred years, though the hands are disfigured by the enormously long nails which it is still the custom to wear, as indicative of the individual being above the necessity of supporting himself by manual labour.

We have, beside the joss house referred to above, a view of another, or perhaps it would be more correct to say the remains of another, in a different part of Canton. The foreground is nothing but a heap of bricks and rubbish, the centre and background being occupied by the part of the building left standing. A group of individuals of different nationalities are intently staring over the broken wall into the interior, while beside the doorway stands "at ease" a British soldier, whose cloth tunic and trousers would induce one to think that such a condition must have been impossible for him in such intensely hot weather. Just inside the doorway we get a glimpse of the phantom of a Chinaman, one might fancy the ghost of a departed bonze, who had returned to gaze on the damaged remains of the fine building, where he once tended the altar of his god. The ruinous condition of this building is not, however, so much owing to the bombardment as to the act of one of the "braves," who, thinking to blow up a number of the enemy, whom he imagined to be located inside, fastened a fusee to a bag of gunpowder, and threw it into the building. The explosion which resulted blew down the greater part of it, and reduced it to the condition we see in the picture.

The small pagoda on the south-east of the city, now occupied by our troops, stands on a mound of light clay mixed with chalk, and formed a conspicuous mark for our artillery, which practised against it with considerable success, as the condition of the wall around it amply testifies. Unfortunately, with the best will in the world not to damage private houses, our artillerymen could not avoid hitting it occasionally; and the shell which passed it by inevitably buried itself among the houses in the hollow beyond, blowing many of them to fragments. From this small pagoda we pass to one of which everybody has heard, viz., the Nine-storeyed Pagoda. This was erected, according to Chinese historians, 1,300 years ago; in shape it is octagon, and each storey is rather smaller than the one on which it rests. A spiral staircase runs up inside, which is well lighted by the numerous windows that each storey contains; but it is long since anybody ascended it beyond a short distance, owing to its dangerous condition: the last person who made the attempt, we believe, was Major Luard. It is said that this pagoda was formerly surmounted by a model of it in iron, to which a tradition is attached, to the effect that, whenever it should fall, the city would fall into the hands of the Barbarians; it therefore caused considerable excitement throughout the city when it became known that the model had fallen from its lofty position; an occurrence which took place a little less than a year before we took possession of the city. It is strange that

* Stereoscopic Views of China from Negatives taken by the Wet Collodion Process by Messrs. H. Negretti and Zambra. Published by Negretti and Zambra, Hatton Garden.

the Chinese should have suffered so conspicuous a monument to fall into the stato of decay in which it is at present. On looking attentively at it in the stereoscope, we can see that much of the projecting portions of the architecture has decayed, and, in fact, it has very much the appearance of a ruin.

The next two pictures we take up are views of the Examination Hall and the grounds attached. The system of competitive examination being of the most open character in China, there are, of course, an immense number of candidates at each examination, and as each candidate was shut up by himself in a cell, or rather, as we see in the picture, a recess, a great number of these recesses were necessary for their accommodation. The appearance of these cells, as seen in the print, is not unlike long ranges of cattle sheds. They are built in rows, and cover an area the extent of which we are afraid to venture an opinion upon; we can count more than twenty rows in the picture, and we do not think this gives a representation of the whole of them. In each row there are upwards of fifty cells, so that we are able by this means to arrive at an approximate idea of the number of candidates at each examination. As might be expected from the great extent of ground it covers, this establishment suffered considerably from the bombardment, the effects of which are very visible in the prints before us. In one instance, a shell passed clean through the wall which formed the back of a cell and exploded in the range behind, making an enormous gap in that and the range beyond it. In the immediate vicinity of the large building where the commissioners sat to examine the productions of the students, whole rows of the cells have been levelled with the ground, while the building itself, at which the shells were probably directed, has come off almost uninjured.

The Imperial College and grounds form the subject of two succeeding pictures of great merit. From the view of the entrance to the college we are led to infer that it is a building of considerablo pretensions. The style is pure Chinese, and has a very fantastic appearance. The wall above the broad arched gateway is ornamented with Chinese characters, and bas-reliefs of figures and animals, and on the roof what appears to be the model of a junk, with a dolphin, or his Chinese representative at each end, standing on his head after the manner of dolphins generally, as may be seen from the cluster which ornaments the gateway of Buckingham Palace. In the grounds belonging to the college we see numerous buildings, some of which have a strong resemblance to the cart-sheds we frequently see beside the roads in this country. There is an air of desolation about the place, only one student being visible, and he is sitting with a thoughtful countenance, like another Marius gazing on the ruins of Carthage.

In the view of Treasury Street we are told we have a view of one of the handsomest streets in Canton; and if this be so, we cannot help pitying those of our countrymen who are compelled to live there. Imagine Field Lane, as it used to be, hung with strips of canvas covered with hieroglyphics, instead of stolen pocket-handkerchiefs, with a matting of bamboo stretched across from roof to roof, and you will have a very good idea of what a handsome street in Canton is like. We remember once meeting with a Chinaman in this country, and he could not conceal his surprise at the sight of the splendid houses we pointed out to him in the vicinity of Kensington Gardens, though he would willingly have done so if he could, for he had all the conceit which characterises these people, and could hardly be induced to admit our superiority in anything.

Opposite the Parcels Office we see an erection which looks like a gigantic mushroom; this is a palanquin stand, where they wait to be hired, like sedan chairs in London in the days of our forefathers, to which conveniences they bear no very distant resemblance. The bearers are, for the most part, squatted on the ground, so deep in shadow that we cannot distinguish their features, notwithstanding that they have removed their hats—which in shape and size have a close resemblance to the circular shields of the ancients—and hung them on the palanquins. Two of them have ventured beyond the shelter of the mushroom, one of whom is squatted on the stones, and looks very much like a huge toad about to hop, and the other is standing erect, though even in this position his tail almost touches the ground. We are rather doubtful about this latter individual being one of the bearers, as he appears so much better dressed than the others. He wears a long linen jacket with pockets at the sides, in which his hands are thrust as if he were a man of a stable mind, black breeches cut in the style of those worn by the Zouaves, and white linen gaiters, which, fitting close to the leg, render the absence of calf painfully evident—a deficiency which seems to exist in the case of Chinese legs generally. As a companion picture to this, we have a group of three sailors, and these sailors—oh! Dibdin and T. P. Cooke!—wear moustachios. We hope they are not English sailors, or we shall begin to think with Sir Charles Napier, that the British Navy is, indeed, going to the dogs. We have another group, which is rather more interesting than the preceding: it consists of a Chinese lady and two attendants—a male and a female. The lady, who has the orthodox club foot, is seated on a stool in front of a huge tree, with an attendant on either hand. Her attitude is free and unconstrained, if it is not graceful; her right foot rests on the ground, and her left foot rests on the right knee. This position must have been the more easily assumed as she was not troubled with long robes or expansive crinoline; her dress consisting simply of a kind of loose jacket fastened close under her chin, and a pair of very loose trousers. The dress of her female attendant appears a little more voluminous, though not sufficiently so to conceal her bony shape. As to the male attendant, there is no apparent difference between his garments and those of his mistress, so far as shape is concerned, the difference, no doubt, being in the material. As regards personal appearance, the mistress has decidedly the advantage, though she has nothing to boast of beyond the possession of a fair amount of flesh, in which her attendants are sadly deficient.

The yamun of Peh-Kwei is an extensive building, making a much better appearance in the stereoscope than in reality. It was here that Colonel Holloway, with only two companies of soldiers, effected a sudden entry, while he was at breakfast. They marched through two or three buildings until they came to one which looked a little better than the others; here they halted; and the rattle of the butts of their muskets on the stone floor brought out an old man to see what was going on. He was dressed in the ordinary blue Chinese dress, and wore a mandarin's cap, with a red button. This old man was Peh-Kwei, governor of the city and province of Canton, whose portrait forms the subject of the next print we examine. He is a better looking man than the generality of the Chinese, and has a more intelligent countenance. He figures in a group along with Commissioner Parkes, the contrast between whose face and those of the Chinamen in the background, is greatly to the advantage of our countryman. The portrait of the Tartar General represents a burly fellow, some six feet four inches in height, with a countenance by no means agreeable to look upon, and, taken altogether, not wholly unlike the pictures of Henry the Eighth. He looked remarkably fierce when our men brought him down in a procession to the presence of Lord Elgin and Baron Gros; but he is a cowardly fellow, notwithstanding, and took care, during the bombardment, to keep his huge carcase out of harm's way.

The last group we shall notice includes the Tartar Brigadier-General and several members of his family, and also the good and energetic chaplain of the British army in Canton, Mr. Huliatt, whose exertions in raising a fund to feed a number of the destitute Chinese, immediately after the taking of Canton, was a practical carrying out of the doctrines of the Christian religion which cannot be too highly praised.

Finally, we must not omit to mention the view of Hongkong—a place in which all of us are more or less interested—and which, but for a lucky accident, would have been the grave of every European resident, immediately after our troops and those of our allies had become masters of Canton. It is represented as snugly seated at the foot of a lofty hill.

We have noticed these views of China at great length, for two reasons. In the first place, the vivid manner in which they bring before us scenes so distant, in which every Englishman must feel an interest apart from mere curiosity, renders them exceedingly interesting; and, in the next place, it is evident that unless the publishers have a large sale for them, we cannot expect that they will again send out photographers, at so great an expense, to such distant regions; and, thus, one of the prime uses of photography—the conveyance of information on the subject of people and things we can never see—will cease to be cultivated. In the pictures we have noticed, there are a few which possess defects on which we have not thought it necessary to dwell. These arise chiefly from over-exposure; but it is easy to comprehend the difficulties under which a photographer

would labour in a country like China, and it would be hypercritical to judge them by the same standard which we should apply to pictures taken in England, where everything requisite can be obtained, and the climate is, on the whole, so favourable for photographic manipulations. We would suggest, however, to photographers working in such very hot climates, that the use of one of the dry processes would be especially advantageous for certain subjects, as buildiugs, for example, and generally for inanimate objects. The great objection to the employment of a dry process—viz., its comparative uncertainty—is, we are assured by several excellent photographers, without any real foundation. Moreover, the same means may be taken to test the condition of the plate as in the wet process; it may be developed on the spot. We do not suggest the adoption of a dry process as a means of saving trouble, but simply because it appears to us that in a country where the heat is so great as to necessitate the use of a highly sensitive collodion, in order to obtain a negative with great rapidity, there is less risk of the picture being injured by over-exposure.

There is one point to which our attention has been called which is of interest to the general body of photographers. The publishing firm, whose productions we have just criticised, some time since published a series of stereograms on glass, the negatives from which they were printed having been obtained at the cost of a large sum of money. Not very long after their appearance several foreign firms pirated these by superposition, and were thus enabled to sell copies at a much lower price, to the great detriment of the original publishers. We are quite aware that where the law is not capable of giving the injured party redress it would be a mere waste of words to attempt to discourage such nefarious practices by any amount of virtuous indignation; but there is one way by means of which a check may be given to such proceedings, and that is by ordering pictures direct from the publisher, whoever he may happen to be.

The Stereoscopic Cabinet. Published by Lovell Reeve, Henrietta-street.

THE first day of the present month was signalised by the issue of the first number of the *Stereoscopic Cabinet*, by Mr. Lovell Reeve. It is to be continued monthly, and each number is to contain three stereograms. The present number comprises a view of the entrance to the Church of St. Ouen, at Rouen, taken by the late Mr. Howlett, which is described as the finest example of Flamboyant Gothic extant; secondly, a statue of Thalia, the goddess of pastoral and comic poetry; two busts, the Rape of Dejanira, and a small statuette, photographed by Mr. Fenton in the British Museum; and thirdly, a view taken on the deck of the *Maraquita* by Capt. Henry on his voyage to Iceland.

The idea of publishing a trio of stereograms monthly at a low price is a good one, more especially as each picture contains a description of what it represents printed on the back; and, moreover, possesses at least an average degree of excellence.

Dictionary of Photography.

HYPOSULPHITE OF SODA AND GOLD.—This salt is well known under the title of sel d'or, and is much used in the toning of proofs. To prepare the sel d'or, add of a concentrated solution of chloride of gold, 1 part to 3 parts of a saturated solution of hyposulphate of soda; alcohol added to this solution will precipitate the salt, which should be again dissolved in water, and reprecipitated by alcohol.

ILLUMINATION.—This term, in photography, applies more especially to the arrangement of light upon the object to be taken; and, as much of the beauty, and the effects of the light and shade, depend upon the light falling in a proper direction upon the object, it is advisable that the operator should always devote his attention to this before proceeding to take his picture. Illumination, artificial, has been applied by several persons, with a view to take pictures without the aid of daylight; and in many instances such illumination is of great importance, especially for the interior of dark cloisters, caverns, mines, &c., where the rays of light can never be brought to bear upon the scene.

IMAGE.—A term generally used to denote the object which appears during the process of development—in fact, it is the latent picture rendered visible by the aid of the developing agent.

INK PRINTING PROCESS, as it is called, is as follows:—Add 25 per cent. of saturated solution of common salt to whites of eggs; beat to a froth, and allow it to subside. Float paper on this for 30 seconds, and then hang up to dry. Now make a saturated solution of bichromate of potass, to which add 25 per cent. of Beaufoy's acetic acid. Float the paper on this solution for an instant, and it is fit for use when dry. This must be done in a dark room. The paper is to be exposed in the pressure frame in the usual way, until the picture appears thoroughly well, but not over, printed. Half the ordinary time will be sufficient. The picture is now to be immersed in a vessel of water in the dark room, and the water must be changed several times, until it comes off colourless. The proofs are next to be plunged into a saturated solution of protosulphate of iron for five minutes, and again rinsed with cold water. Again the proofs must be soaked in a saturated solution of gallic acid, where they must remain until there is no appearance of the yellow bichromate in the shadows. Rinse again. Lastly, immerse in the following solution:—Pyrogallic acid, 2 grains; water, 1 ounce; Beaufoy's acetic acid, 1 ounce; saturated solution of acetate of lead, 2 drachms. This brings out the details well, and clears the lights instantly. Finally, rinse well, and the process is complete.

INSOLATION.—A term derived from the French, and which signifies exposing to the sun, as, when a picture is printed by sunlight, it is by *insolation*.

INSTANTANEITY.—Like the preceding, a photographic term; but concerning which there are many opinions. Some persons, being able to take pictures quicker than others, feeling disposed to apply the term to the $\frac{1}{500}$th of a second, whilst others apply it to any space of time less than a second—which, probably, may be sufficiently applicable to ordinary cases.

INVISIBLE RAYS OF SPECTRUM.—Those rays which are more refrangible than the visible rays of the spectrum, and which are, though unseen, most active in impressing the photographic image upon the sensitive iodide of silver.

IODIDE OF AMMONIUM may be formed either by dissolving iodine in hydrosulphate of ammonia, or by first making an iodide of calcium, and then precipitating with carbonate of ammonia. The crystals are to be dried *in vacuo*, over sulphuric acid.

(*To be continued.*)

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS.—PRINTING FROM GLASS NEGATIVES.
(*Continued*).

THE *printing* process is to be conducted as follows:—The shutter of the pressure frame is to be removed, and the glass wiped with a dry rag, to remove particles of dust, &c. The negative is now to be laid upon the glass, with the *collodion side upward.* If there are any specks of dust upon the negative, these should be removed with a soft brush; the glass side of the negative may be wiped with a cloth. Now cut a piece of sensitised paper rather larger than the negative, and take care that the fingers do not touch the sensitised surface, as the print will appear stained at that part. The paper is now to be carefully laid upon the negative, *albumenised side downward*, and the folds of blotting paper laid over this. The shutter may now be placed in the frame, and the crossbars lowered and fastened.

Expose the pressure-frame to the light, or directly opposite the sun, and watch the outer edge of the paper for a few moments, when it will be found to have become tinted instantly of a greyish colour; this will gradually darken, passing from the various shades of brown until it assumes a rich chocolate brown, or sepia, except in some instances when the paper is thin

and very highly albumenised, when, probably, shades of purple tint will appear instead. If the printing be carried ou in the direct sunlight, after the frame has been exposed for about five minutes, or even less, on a warm day, the frame should be removed to a shady place, and the proof examined. This should be managed thus: unfasten one of the springs, lift one half of the shutter, and, raising the blotting paper and the half of the print beneath it, ascertain if it looks *over-printed*, that is to say, the white parts of the picture should appear slightly purple or brown; if the print assumes this appearance, it is done, and may be removed from the frame, and must not be allowed to come in contact with the light. If, on the other hand, the proof is pale, and the white parts still remain white, the shutter should be again closed, and the frame exposed for a short time longer.

When a well-printed (that is to say, rather over-printed) proof is obtained, it may at once be placed in the toning-bath, which should previously have been poured into the flat porcelain dish; and it must be moved about at first, and every now and then, to disperse any air-bubbles which have been formed. If this is not done, each bubble will have prevented the action of the hypo. and gold, and each of those spots will assume a red or brown colour, while the other parts of the print are of the proper tone.

When the bath is new, provided that the weather is not exceedingly cold, the toning of a proof should be complete in about fifteen or twenty minutes. On first placing the print in the toning-bath, it turns a bright red colour, and this, shortly afterwards, changes to brown. By continuing the action for a longer period, the print changes to a purple, or purple-brown tone, when it is finished, and may be at once placed in cold water.

In the operation of toning, the hyposulphite of soda removes the nitrate of silver and the chloride of silver from the surface of the paper, and thus the picture becomes *fixed;* whilst the chloride of gold causes it to assume those different shades of colour which constitute the process termed *toning*. Thus, in the bath I have selected for the beginner, both fixing and toning are carried on at the same time. I will hereafter refer to other processes, in which the operations of fixing and toning are carried on separately.

The student must bear in mind that the hyposulphite of soda, if it be allowed to remain in the interstices of the paper, will eventually destroy the proof, therefore he must be careful to wash the print well.

The water in which prints have been soaked should be changed frequently; and it is scarcely safe to dry them unless they have been washing for ten or twelve hours. Where it is convenient, it is advisable to place the proofs in a vessel of water with a small aperture at the bottom, and allowing a tap to continue dripping into the vessel from above, by which means a gentle motion will be kept up, which favours the process of washing materially. In cold weather, it is advantageous sometimes to wash the proof in warm water; but in this case, the water should never be of a higher temperature than the hand will bear.

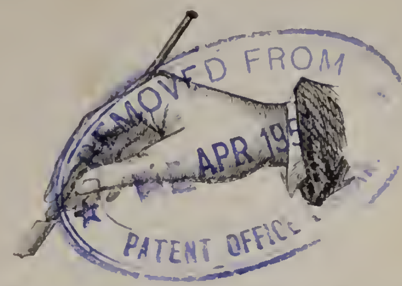
(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Cutting Glass with a Diamond.—The various modes of cutting or dividing glass we have hitherto described, have chiefly had reference to the division of tubes, bottles, &c. Flat pieces of glass, whether plate, sheet, or crown, are best cut with a diamond. As the ability to cut plates of glass to various sizes and shapes is almost indispensable to the photographer, the possession of a cutting diamond, and the knowledge how to use it, is highly important.

The cutting diamond, or glazier's diamond as it is generally called, is a fragment or spark of the precious stone set in brass on an iron socket so as to present a cutting point. The iron socket is attached to a handle of hard wood, which is cut thin in the middle, so as to be held easily between the fingers. The socket is set on a centre or pivot at the end of the handle, having a certain amount of play, so that, when pressed against the guiding edge, it may always present the cutting point. In order to find the cutting point or the "cut," as it is termed, it is imperative to hold the diamond in the proper position. The top of the handle should go between the roots of the fore finger and middle finger, the lower part being held between the end of the fore finger and thumb, resting against the side of the middle finger, something like the engraving:—



When the diamond is held properly in the fingers, a few trials must be made to find "the cut," varying the angle of inclination, holding the handle more upright or more slanting, as may be required, until the right position is obtained in which a clean cut is produced, instead of a mere scratch. A little practice will be required to effect this. The amateur will find it much more easy to produce a rough, jagged scratch than a clean cut. This scratch will be of small service indeed, for whilst, on applying pressure, the glass may sometimes break in the line of the scratch, it is just as likely to fly elsewhere. It is very easy to distinguish the cut from the scratch, even whilst in the act of making it. In making a cut, the diamond is felt to have a slight bite, but glides smoothly along the glass without noise, and presents a clean, fine line, which, on examining at the opposite side of the glass, is found to be an absolute cut through a certain portion of the thickness of the glass. When a mere scratch is being produced, the passage of the diamond over the glass causes a grating, unpleasant sound, and, instead of cutting, merely produces a ragged abrasion of the surface. This is generally the result of using the instrument in a position which does not present its cutting point to the glass.

When the right position for cutting is found, a little care must be taken always to use this instrument in that position, as, besides not producing the result, the diamond is not improved by misuse. The same angle must be carefully maintained throughout the cut, the movement of the diamond over the glass not being produced by the fingers or wrist—which, if moved, would inevitably alter the inclination of the handle and lose the cutting point—but a movement of the whole arm. In running a pencil or pen along a ruler or straight edge there is a natural tendency to alter the angle of inclination, the pencil or pen gradually assuming a perpendicular position as it approaches the end of the line. It will be obvious that in using a diamond, if this were done, the cutting point commenced with would be lost before the end of the line.

In addition to the diamond, a straight-edge will be required, which may be made of any kind of hard wood, say an inch and a half broad, a quarter of an inch thick, and as long as may be required.

The glass should always be cut on a perfectly level, smooth table, covered with cloth, baize, or velvet, so as to give an even, firm, and somewhat elastic bearing. Any hollow or inequality on which the glass might rest, would almost certainly cause it to break. The straight-edge being placed on the glass, with its edge about the twelfth or sixteenth of an inch within the line to be cut, the diamond is placed fairly against the edge and drawn with a steady, light but firm pressure along the surface, carefully, as we have said, keeping it in one position. If the cut has been properly effected, a very slight lateral strain will generally suffice to divide the parts. If the cut has not gone quite to the end of the line, as will sometimes happen, a slight tap underneath with the diamond handle will sometimes serve to make the cut fly to the end in the proper line. Glaziers and glass cutters generally draw the diamond towards the body, not from left to right, as is commonly done in ruling a line with a pencil.

In cutting a narrow strip off a piece of glass it is sometimes difficult to separate the strip after it is cut, especially if the

glass be thick, the strip very narrow, or the cut not very perfectly effected. The pressure of the fingers is then insufficient to divide the two parts; in such a case a pair of pliers or nippers may be used. Some caution is required, however, in doing this, or the pressure of the iron will fracture the glass and make it fly in any direction but the desired one. This danger may be avoided by placing a piece of cotton rag between the glass and the iron surface, when the risk of fracture will be very much lessened. If pliers or pincers be not at hand, the wards of a key will answer a similar purpose; the edge to be separated must be placed in a ward that nearly fits it as to thickness, and the key used as a lever. There is less danger of a fracture by this method than the use of the pliers.

The diamond should never be drawn again through the same cut, as this cannot be done without risk of injuring it. If a scratch or imperfect cut have been made, another cut immediately by its side—or, if this be not admissible, on the other side of the glass—should be made, but no attempt to amend by another effort the same cut. If the cutting point of a diamond be injured by accident, carelessness, or long use, it may generally be re-set by persons engaged in the business.

We have dwelt somewhat in detail on the right method of using a diamond, not only because of its general importance to the photographer, but because we have frequently known cases where, in first using it, many efforts have been made with the sole result of spoiling an expensive diamond and fracturing much glass; whilst a few judicious hints at the outset might have prevented both these undesirable results. Attention to the directions we have given will, we think, enable the tyro, with a little practice, to use this instrument in a workmanlike manner.

We shall next week give some hints on the method of cutting oval and circular shapes, as in cutting glass positives into lockets, &c.

(*To be continued.*)

Photographic Chemistry.

HYDROGEN—(*continued*).

Water may very easily be made to assume a gaseous state; the temperature at which this takes place depends on the degree of pressure of the atmosphere; under ordinary circumstances it boils at 212°, but on an elevated spot, as the top of a mountain, it boils before reaching this temperature, and no amount of boiling in contact with the atmosphere can raise the liquid above this point. As an illustration of the low temperature at which water may be made to boil, when the pressure of the atmosphere is withdrawn, we may mention that if a vessel containing water, frozen on the surface, be placed in a vacuum, the water will boil beneath the ice.

The composition of sea water differs from river water, chiefly in the quantity of chloride of sodium it contains, the other substances found in it amounting to only an inconsiderable total. Thus in every 1000 parts of sea water there are about 27 parts of common salt, and 9 parts of other matters, more than half of which consists of chloride of magnesium and sulphate of magnesia.

The combination of water with certain bodies produces a class of compounds known as *hydrates*, sometimes accompanied with very energetic action, and the evolution of considerable heat. Some of these compounds are not decomposable by heat: this is the case with oil of vitriol, for example, which is a hydrate of sulphuric acid.

A great number of substances, both solid and liquid, are soluble in water, the proportions of which may generally be increased if the aid of heat be called into requisition, though, when the solution cools, a portion of the substance dissolved will be precipitated in the form of crystals, and the remainder may be obtained in the same form by evaporating the solution. The evaporation is readily effected by pouring the water containing the substance in solution into a capsule, and heating it over a spirit lamp. In cases where great care is requisite, as in chemical analyses, the liquid must not be suffered to boil, or some of the solution will be wasted by flying over the side of the vessel. A very good method of applying the heat gradually, is to evaporate the solution in a water bath, that is, by placing the capsule in another vessel containing water, beneath which the lamp is placed. In laboratories where a great many solutions are evaporated at the same time, it is customary to place the different vessels on a kind of hot plate covered with a sufficient depth of sand, and having a fire under it. There are cases in which it is necessary to conduct the evaporation very slowly; this may be accomplished by placing the capsule in a glass dish containing concentrated sulphuric acid, and covering the whole with a bell glass. In this case no artificial heat is applied; and, in proportion as the solution evaporates, it is absorbed by the sulphuric acid.

Water dissolves gases in various proportions, according to the nature of the gas; from some it absorbs very little, whereas in the case of others, the proportion is very great, as, for example, from ammonia and hydrochloric acid. As a general rule, the solubility of any gas in water is greater as the water is colder, and the pressure of the undissolved gas on the solution is more powerful.

A striking instance of the energy of water as a solvent, when heated much above boiling point, was given by Dr. Turner. He inclosed pieces of crown and plate glass in a wire cage in the upper part of a high-pressure boiler, and on examining them, after they had remained in this situation for four months, he found that the alkali had disappeared and only silica remained

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 15th November, 1859.

It is now more than a year since Dr. Ed. Schweitzer, of Zurich, made known his curious discovery, that certain compounds of oxide of copper and ammonia had the property of dissolving cellulose with rapidity, and without decomposing it. M. Goubert has lately called the attention of the *Société Botanique* to this fact. "Schweitzer's reagent," says M. Goubert, "is an oxide of cuprammonium, or an ammoniacal oxide of copper, to which the formula $2NH_3CuO$ has been assigned. As the preparation of this oxide is difficult and expensive, M. Schweitzer proposed another dissolvant, namely, the green sub-sulphate of copper, in place of the basic hyposulphate, originally employed. M. Peligot, for his analytical researches on the skin of the silkworm, has simplified this preparation: he obtains the blue liquid by putting metallic copper into liquid ammonia, and exposing the whole to the air. The compound which is thus formed does not possess the same formula as Schweitzer's reagent, but is, according to M. Peligot, a basic nitrate of copper and ammonia, with excess of alkali. If the liquid is not clear, it must be filtered through asbestos; a common paper filter would be readily dissolved. The liquid thus obtained converts cellulose into a thick gelatinous mass, which dissolves easily when the solution is well stirred. When an excess of acid is added to the solution, pure cellulose is precipitated in a flocconous state."

The employment of this blue solution, in his analytical researches upon the skin of the silkworm, has brought M. Peligot to some very remarkable conclusions:—It is well known that when flesh, or bones, hoofs, &c., are boiled down with water, a peculiar substance, having a great affinity for tannic acid, is obtained. This substance is gelatine, often employed by photographers. But, at the same time, another substance, very similar to gelatine, though not precipitated by tannin, is also obtained, especially if certain tissues, such as the cartilages of the ribs, or, according to Müller, diseased bones, have been employed. In the class of mammalia, gelatine appears to predominate; thus, the horns of a deer, for instance, furnish the half of their weight of this substance. Chondrine is supposed by some authors to predominate in fish. But, in the insect world, another principle, somewhat similar, was discovered, namely, chitine. Originally investigated by Lassaigne, and afterwards by Payen, chitine was found to be a peculiar substance, *sui generis*, which forms part of the exterior teguments of

animals lower than fish, such as insects, crustacea, &c. But, of late years, cellulose has been found to form part of the tissues of these inferior animals; a fact worthy of much note, as, before it was discovered in certain mollusca, bryozoa, &c., it was looked upon as a characteristic element of the vegetable world. M. Peligot, who is esteemed here as a distinguished chemist, and a member of the institute above alluded to, has arrived, from his researches with the copper solution, at the conclusion that the substance called chitine does not exist, but that the teguments of insects, crustacea, &c., are formed of a mixture of cellulose and proteinic (or nitrogenated) principles. These conclusions are so much the more curious, as, many years ago, M. Payen, also a member of the institute, examined chitine and cellulose comparatively, and found them to be completely different substances.

Some years ago, chemical philosophers and physiologists inquired into the action exercised upon the system by beverages—such as tea, coffee, cocoa, &c. As the result of numerous experiments, conducted in such a manner as to afford very little space for doubt, it was found, more especially for coffee—a beverage which Louis XIV. used to term "*la boisson de l'intelligence*"—that they exercise a remarkable influence on the activity of the brain, exalting, to a certain degree, the nervous life, but in a different manner from opium and spirits, since they act as antidotes to the narcotic influence of the first, and relieve the intoxication produced by the second. Moreover, that they allay hunger, retard the change of matter, or, in other terms, diminish the amount of bodily waste in a given time. They diminish more especially, according to Dr. Prout, the quantity of carbonic acid given off from the lungs in a given time; and, from the experiments of Professor Lehmann, they lessen the quantity of urea, phosphoric acid, and chloride of sodium, secreted in a given time into the urine. Such are the general results obtained, not without much labour, concerning the physiological effects of these beverages, and most important and satisfactory they are.

It was scarcely less interesting to investigate the physiological effects of spirits, of which such abuse is made in the northern climates of Europe. The liquors known under this appellation are little else than alcohol diluted with a large proportion of water, and flavoured by the admixture of one or more volatile oils, in very slight quantity—*i.e.*, that is the result all spirits give on analysis. They contain, therefore, none of the well-known forms of nutritive matter which exist in animal and vegetable food. It was thought, however, up to the date at which I am writing, that these spirits had a certain nutritive value, similar to that of coffee or tea; it was supposed that they lessened the amount of bodily waste in a given time. It was supposed, I repeat again, that they directly warm the body, and, "by the changes they undergo in the blood, supply a portion of that carbonic acid and watery vapour, which, as a necessity of life, is constantly being given off by the lungs." Such opinions have, up to the present time, been running through most of the chemical, physiological, and medical class-works. In a word, these spirits were supposed to supply the place of ternary aliments, such as fat, or starch, &c. Alcohol is, indeed, generally looked upon as a heat-producing aliment, which, like fat, sugar, starch, &c., is burnt by the atmospheric air introduced into the lungs, transformed into water and carbonic acid, thereby producing, or rather, aiding in the production of the normal amount of "animal heat." By this theory, it was easy to explain why most alcohol is consumed in the colder climates, in the same way that a Cossack or an Esquimaux is sometimes delighted to get hold of a large tallow candle, whilst a south countryman would find it very difficult to swallow half an inch of such an aliment. Now, three French *savants*, MM. Duroy, Lallemant, and Perrin, have come forward to show that this theory is all a dream. If alcohol is really an aliment, it would be, as stated above, entirely destroyed in the blood, and it would be impossible to detect its presence in any organ of the body, such as the kidneys, the liver, &c. But the gentlemen above mentioned assure us that alcohol can be detected in all the liquids, and in all the tissues of the human fabric! At the same time, they add, it is impossible to detect, in the body, any products which arise from the decomposition or combustion of alcohol (meaning, doubtless, aldehyde, acetic acid, &c.). According to the same authors, alcohol leaves the system in different ways: by the lungs (our readers have certainly heard of the *spontaneous combustion* of drunkards when lighting a pipe, or approaching too near a fire, &c.), by the skin, and especially by the kidneys. Alcohol is therefore not an aliment, but a sort of medicine which has a peculiar action upon the nervous system; neither destroyed nor transformed in the animal economy, it concentrates itself more especially in the liver and in the brain. An old fellow-student of mine at Brussels, who is now a first-rate medical practitioner, when asked at one of his examinations what was the action of alcohol on the system—allusion being made, no doubt, to Liebig's theory of heat-producing elements—replied, that, as far as his own experience went, alcohol only possessed the disagreeable property of causing one to stumble over one's neighbours' scraper when returning home at night! He explained subsequently that he was not prepared to admit that alcohol could be looked upon as an aliment, thereby entering into the views of the authors whose researches I have just been discussing.

At the last meeting of the Paris Academy of Sciences, M. Duméril, one of the oldest and most distinguished members of this noble institution, presented to the meeting his two volumes entitled, *Traité Analytique des Insectes*, which form part of the *Memoires de l'Academie*. On this occasion he read a short *resumé* of the contents of the work; insisting more particularly upon his new method of classification; on the means of finding out the order, family, class, genus, and species of any insect; on the 400 woodcuts which illustrate the work, &c. The noble old man could not suppress his joy, which was certainly participated in by those around him, at having lived long enough to terminate this work, which may be looked upon as the result of fifty years of labour, and in which are incorporated all the memoirs, notes, or articles which he has published in the course of his distinguished life, in different periodicals, encyclopædias, &c., where many of them were dispersed and ignored.

As I am speaking of insects, I will relate to you some interesting facts connected with the metamorphosis of two well-known genera, investigated a few months ago by M. Fabre. The genus *Sitaris* and that of *Meloe* are both closely allied to the cantharides, or Spanish flies, well known to all; and your entomological readers are, no doubt, well acquainted with the insect known as *Meloe proscarabæus*, or oil beetle, so called from a fragrant-smelling oily fluid which the insect exudes when it is taken into the hand, and to which have been attributed the most miraculous properties—amongst others (and least of all), that of radically curing rheumatism! M. Fabre has published the following interesting results of his researches on what he calls the *hyper-metamorphosis* of these coleopterous insects. As regards the genera *Sitaris* and *Meloe* he has arrived at these conclusions:—

Sitaris and *Meloe*, in common, perhaps, with the whole tribe, are, in their young days, parasitical animals, living upon the bodies of certain honey-making *hymenoptera*. Their *larvæ*, *before arriving at the pupa state*, go through no less than four distinct metamorphoses or transformations! The author finds himself obliged to invent new names to characterise these new phases of insect life. He denotes them *primitive larva*, *second larva*, *pseudo-chrysalis*, and *third larva*. The passage from one of these forms to the other is effected by a simple process of moulting, or throwing off of the outer skin, the viscera remaining unchanged.

The *primitive larva* is a hard, crusty little being; it takes up its abode on the bodies of *Hymenoptera* (the Bee tribe). Its sole idea is to see itself quietly transported and deposited in a cell overflowing with honey. Once there, the little

wretch immediately sets about devouring the offspring of the generous *Hymenoptera*, breakfasting upon the egg contained in the honey-cell of this unconscious insect. This feat achieved, the part of the primitive larva is performed.

The *second larva*, both soft and effeminate, differs widely from the voracious little creature just described. It lives upon the honey of the bee cell, the *larva primitiva* having satisfied itself upon the bee's egg.

The *pseudo-chrysalis* might be mistaken for a bit of gutta percha; it is perfectly deprived of motion, a complete emblem of inertia; its sheath is of a hard, horny quality, resembling somewhat that of an ordinary chrysalis. On this exterior covering is observed something shaped like a head, and six little tubercles, which are, no doubt, indicative of feet.

"Coming events cast their shadows before."

In the present instance, however, we might say, *a long way before*. Moreover, nine pair of small fissures represent the *spiracula* by which the future insect, in its perfect state, will breathe.

The *third larva* brings us back again to the *second larva*, to which it bears a perfect resemblance; although a few of the pseudo-chrysalis' torn raiments still adhere to its body, indicating through what hedge this one has passed into the field of life. Henceforth, the habitual metamorphosis of insects follows out its ordinary course: this *third larva* becomes first a pupa, or chrysalis, to emerge again as a perfect insect!

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

I found Dsetjuma waiting for us at the foot of the hill, and I must do him the justice to say that he appeared to have borne my absence, under the circumstances of risk, which he supposed I was encountering, with great fortitude.

Our way back to the village was not marked by any incident except the sudden disappearance of one of our men, as we were crossing a field close to it. He made a tremendous outcry, and with good reason, for we found he had fallen into one of the tubs of which I have spoken. Luckily, he had fallen across it, and had managed to catch hold of the opposite side, and so saved himself from going in head first, though it did not prevent the greater part of his body from sinking into it. His condition, when he managed to scramble out, was not precisely as if he had taken a bath in otto of roses, and we left him behind to arrange himself in the best way he could.

We found our Japanese friends waiting up for us, and they seemed very pleased to see us back again, and we were not less pleased to see them, after the anxiety we had undergone. The character of the Japanese, generally, is very hospitable, as far as their means enable them to be so. It is true it did not cost them much for the refreshments they offered us, but I fancy that, taking their incomes into account, the refreshment they placed before us must have cost them as much, in proportion, as the more liberal hospitality we should have met with in Europe; but what was wanting in this respect was amply compensated for by their cheerfulness and gaiety, which, judging them by the standard to which I had been accustomed in Holland, bordered on license. The night was considerably advanced when they thought it time to retire to their beds, which consisted of raised couches arranged round the apartment in which we sat. For my part, I had lain down some time before the others followed my example, but it was impossible to sleep in the midst of so much noise; and, even when the lamp was put out, and I had fallen asleep, I was not suffered to remain in peace, for I was awakened by finding that somebody had taken possession of a portion of my couch, and as I did not approve of such close proximity, I was forced to get up; and taking my rug, I rolled it round me, and threw myself on the floor, where I slept soundly until the morning.

* Continued from vol. iii. p. 117.

I believe I was the first to wake in the morning, and as I never indulge here in the habit I had accustomed myself to at home, of thinking whether it would be better to get up at once or stay where I was for a few minutes longer, I rolled out of my rug and stood up. I looked round the room and was a good deal astonished at seeing the manner in which the sleepers had arranged themselves. I was at first disposed to wake up Dsetjuma rather roughly, but reflecting that it would be impossible to make him feel ashamed of what he could not comprehend to be wrong, I left him to finish his sleep undisturbed.

The sun was not above the horizon when I stepped out of the morally and physically impure atmosphere of the room where we had slept into the fresh, pure atmosphere of the garden. In this, as in all other countries with which I am acquainted, the dawn of day is the most delightful portion of the whole four and twenty hours. There is a peculiar stillness which has a powerful effect on the imagination. It is not the effect produced by the stillness of night, but something entirely different; combined with the feeling of profound repose which rests on everything around, there is the instant expectation of an event which shall totally change the appearance of every object—an event which seems to give life to even inanimate substances. As I stood looking in the direction of the hill from which we had come on the preceding evening, I could perceive the gradual lighting up of the landscape, the stars grew rapidly paler, the sky assumed a less deep blue tint, the birds began to flutter about and twitter, and then a red flush rose on the horizon, and directly afterwards the image of the sun appeared and gave a totally different aspect to everything. I cannot think that the most thoughtless could observe this phenomenon day by day without his moral feelings being elevated; at all events, it is to this I attribute my being able to preserve myself from the contaminating vice which exists in this country to an extent which exceeds that of any other where civilisation has attained the same degree of development—a vice which the majority look upon as a virtue in proportion to the capability of the individual to practise it.

The sun had not risen many minutes when I saw men and women begin to make their appearance about the cottages, of which there were probably forty in the whole village. I addressed an old woman, and with some difficulty made her comprehend that I wanted to be shown the way to a river, and, after I had got the information, I started off in the direction she pointed out. The place she indicated was not far from the village, but instead of a river I found it was nothing but a very large pond—so large, indeed, that I knew it must be fed by a stream, although I could not see any point of influx. The water had a clear, dark appearance, from which I concluded that it must be of considerable depth. I selected a spot, beneath a large tree, to place my clothes, and then plunged into the water. In an instant, I felt my arms and head ploughing through the softest imaginable mud. Luckily, in consequence of not knowing the depth of the water, I had not plunged so perpendicularly as I should otherwise have done, and, therefore, managed to get my head to the surface, just as I felt myself on the point of being stifled. The mud was of a very dark colour, had a strongly-pronounced bituminous odour, and was excessively unpleasant to the taste, as I had ample means of judging. I could not ascertain that this piece of water had any name, nor that it had occurred to the memory of anybody in the village, though they said it was not nearly so high as they remembered it to have been; indeed, unless fed by a stream or springs, the evaporation would very soon render it dry, as the heat of the sun is intense. It is owing to the great heat that I find it exceedingly difficult to get satisfactory negatives. If I do not expose immediately on removing the plate from the bath, it dries before I can get the image impressed upon it, so that it very frequently happens that they are stained. I have no remedy for this, because the substances which would prolong the sensitiveness of the collodion are unattainable, or beyond my reach. What is requisite

for practising photography in this country with success, during the hot season, is a very sensitive collodion, and then great care must be taken not to over-expose, for the energy of the actinic rays is very great. It has occurred to me that the addition of a moderate quantity of refined sugar to the bath might have the effect of preventing the rapid drying of the plate, but I cannot try the experiment, because I cannot get the sugar without returning to Nangasaki.

(*To be continued.*)

Miscellaneous.

Cases for Preserving Sensitised Paper.—We mentioned some time since that M. Marion had invented a case for the preservation of sensitised paper. This announcement was followed by a declaration from M. Wulff, that the invention was not due to M. Marion, but that they had manufactured this case some time previously for M. De Rumine. The affair, however, was eventually arranged in a manner satisfactory to both parties. The case invented by M. Marion consists of a frame containing the preservative substance, the hygrometrical properties of which tend to keep the paper free from change. The frame containing this substance is capable of being adapted to anything which can be used for holding papers, but it is fitted in a case especially made for the purpose. The advantage of possessing a case of this kind will be evident when we mention that, according to a report of a committee of the French Photographic Society, sensitised papers which had been kept in it for a month were quite free from colour when removed, and were used by them in the production of pictures; so that photographers can avail themselves of this newly-invented case to prepare a stock of paper on wet days, to be used on more favourable occasions. We have tested the case ourselves, and have found that paper was preserved in it free from change far longer than would have been the result had it been kept in the ordinary way.

Photographic Notes and Queries.

THE FOTHERGILL PROCESS.

Sir,—Your correspondent, "M. N. P. S.," evidently falls into the opposite extremes, of washing too much of the free nitrate from his Fothergill plates, or of leaving too much of it on; for, after washing a stereogram plate with the four drachms, there is abundantly enough of the nitrate left on without dipping into a two-grain solution; and the excess, so obtained, would, of course, endanger the keeping qualities of the plate, though it might leave it very sensitive, if used soon after its preparation.

The two-grain solution might do very well if the whole of the original bath solution were washed from the plate with two or three changes of water, as, in this way, you would certainly get rid of any iodide of silver which might be precipitated on the surface of the plate owing to the dilution of the original bath solution, and which might form nuclei for the formation of opaque spots. Still I have found, in my practice (and I have prepared several dozen this summer), that the four drachms is quite enough for all practical purposes; and I have found that, on this washing, and the subsequent coating with albumen, the greater part of the danger of marking depends—so much so, that I can *produce* or *avoid* the water marks almost at will. Thus, if you pour the water all on one spot, you will produce a mark similar to that produced by pouring your developer on one spot. I found the best plan to be, to drain the plate well; after removing it from the sensitising bath, wipe the back with blotting paper, and attach a pneumatic holder; then, holding the plate with the left hand, pour over it (from a measure) the four drachms, spreading it as much as possible; then move the plate about till the water flows evenly, without any greasy appearance; pour off, and drain on blotting paper for a short time. Next (still keeping the plate on the holder) pour over it two drachms of the prepared albumen, taking care that it flows in one wave, from end to end, in the same direction that the plate was drained; if it is checked in its course, or the albumen meet from two directions, a water mark is the sure result; when the albumen has reached the lower end, it may be worked round the plate for about half a minute, to insure its union with the film at the edges, and then pour off; and, I may here remark, that unless the first washing be continued till every sign of greasiness disappears, it is almost, if not quite, impossible to get the albumen to flow evenly. I have also observed, that my best results were obtained with albumen that had been prepared the longest. The muriate of ammonia, which I add (six grains to the ounce), seems to be quite sufficient to preserve it. After albumenising it, I finally wash it in two or three changes of water, in a dish, and dry before a *hot* fire as quickly as possible; this, I think, prevents stains from unequal drying. With plates so prepared I have taken stereograms in eight to ten seconds frequently. This enables me to take objects which would be impossible were I forced to give six to eight minutes, as "M. N. P. S." has to do.

I inclose two prints taken in July last, one in ten and the other (the quarry view) in twelve seconds. At this time of the year I can take a view in from forty to fifty seconds, and can, at all times, be sure of ten or eleven pictures out of every dozen, and that is surely as much as one can do, even by the "wet" process. J. Walter.

PATENTS FOR BI-COLOURED STEREOGRAMS.

Sir,—Will you allow me to add a few more lines, which shall be final, on bi-coloured stereograms? The first I coloured, which I have still by me, was in 1849 or 1850, and were the original stereoscopic slides, being diagrams, formed with lines; the effect produced was not what I anticipated, as I expected, by colouring the corresponding parts in primary colours, on the coalition of the two a secondary colour would be the result; the effect was pleasing, but not suited to the kind of pictures, and, by the suggestion of a friend, an artist, I laid them aside, until pictures more suited to the effect should be published.

In reply to "Nemo," it is not very difficult to realise what the result would have been had the discoverer of the application of collodion patented it. A small annual licence, paid by those who have reaped, and are reaping, a rich harvest from his discovery, would have placed his family in independence, and rendered the frequent appeals on their behalf unnecessary. I cannot see that the protection of the invention would in any great measure have retarded the practice of the art, but it might, possibly, have prevented the abuse, which you have several times in your journal referred to. From the way in which Mr. G. W. Simpson treats the subject, I am inclined to think he is not aware of the nature and amount of publication required to be proved to invalidate a patent. R. Harmer.

STEREOSCOPES OF LONG FOCUS.

Sir,—Permit me to draw the attention of your readers to stereoscopes of long focus, which give a magnificent perspective, will admit of a much larger picture, and render the scene with a splendour only exceeded by nature; while, by bringing the picture near the lenses, the magnifying power equals that of the ordinary stereoscope. The one I have got made is composed of two achromatic object glasses, 18-inch focus each. The frame carrying the picture is in a slide, and enables us to bring the pictures from the lenses, varying the distance from nine to twenty-four inches, and it acts as a magnifier at a shorter distance. The lenses are placed in slide work to adjust to different people's eyes, the diaphragm is an expansive one, the frame is not inclosed at all, and no reflector is used. Jos. Bell.

Gateshead, Booth Bank.

[We have for years past seen stereoscopes of the above kind in the possession of Professor Wheatstone, who has

frequently expressed to us his preference for such large instruments and pictures over the diminutive specimens now in use. A very excellent size would be 5 × 4 for each picture; and in a stereoscope furnished with achromatic eye lenses of 12-inch focus, and provided, if necessary, with achromatic prisms, to give the necessary convergence; such pictures appear far superior to anything we have ever seen elsewhere. We wish some of our enterprising opticians would take the matter up, and provide sets of stereoscopic apparatus for 5 × 4 pictures, with suitable stereoscopes for the same. They could not fail to be rewarded by a very large demand.—Ed.]

CHLORIDE OF GOLD.

Sir,—As every photographer is not necessarily an adept in chemistry, it is highly desirable that the amateur should obtain chloride of gold when he asks for it at the photographic chemists. Lately, the auro-chloride of sodium has been very frequently and largely substituted for the chloride of gold; in some instances the bottle containing it being labelled "Double Salt of Gold." Now, this is all very well as far as it goes, and the substitution of a non-deliquescent for a highly deliquescent salt, certainly an advantage gained; but the half drachm bottle of gold salt, although charged five shillings (the same price as the chloride), contains only half the quantity of gold, thus raising the price to four pence a grain. If photographic firms continue to vend the auro-chloride, I trust whenever a purchaser sends or asks for 30 grains of chloride of gold, they will either send the real article in crystals or in solution, viz., one grain of salt to one drachm of distilled water, or 60 grains of the auro-chloride, and not *the same* weight as heretofore.

Wide Awake.

HAS THE VAPOUR FROM PINE ANY DETRIMENTAL EFFECT ON THE NITRATE BATH?

Sir,—Being very desirous of shielding my nitrate bath (a glass one containing 40 oz.) from the baneful effects of light, I had a perfectly light-tight box of pine constructed, and in it I placed my bath, at that time in most perfect working order. This happened in June, and, for some time, the bath comported itself admirably, yielding remarkably vigorous negatives, quite free from fog. In the beginning of August, I first found that the plates began to lack intensity, and, moreover, when fully developed, seemed covered with a deposit producing a fogginess, which, on drying, became converted into a fine dust, and could be readily removed by gentle friction with the finger, without inflicting the slightest injury on the negative, which was greatly improved by the treatment, and generally afforded good prints. Upon inspecting the bath, I found the sides covered with a black deposit; the glass dipper, too, was similarly coated, the deposit resembling that found in old gutta percha baths. This deposit is evidently reduced silver, caused, I imagine, by the vapour from the wood of which the box is made.

H. R. R.

LUNAR PHOTOGRAPHY.

Sir,—In reply to your correspondent, "LL. B., Cantab.," will you allow me to say, that the size of the image of the moon, as taken by Lord Rosse's telescope, is not nearly so large as stated, seven inches being nearer the truth; but mechanical difficulties, rather than optical, have operated to prevent much use being made of the instrument for photographing the moon. As the moon is only visible for two hours, in consequence of the position of the telescope and the small portion of the heavens it can command, an observer's opportunities would be very limited, even if the clockwork-movements were sufficiently accurate to drive the instrument to follow the moon's apparent motion; but I believe that photographs of the moon have been done by it, but not with anything approaching the results anticipated by your correspondent.

Samuel Fry.

TO CORRESPONDENTS.

M. H. O. writes as follows: "Sir,—I hasten to inform you that I have succeeded in producing photographs in positive natural colours. I will give you a few hints as to the process, and a detailed account, next week. I sensitise a plate, and cement it air-tight in the frame, with the sensitised side to me—not to the sitter; and then I have a galvanic battery at work, attached to the back of my camera. I set it to work immediately, to silver the plate, so that the coating of silver and the portrait is complete and fixed at the same time. The outline is rather foggy, but the colours, which at present are rather faint, are as perfect as your own on a looking-glass, and have the same effect exactly. I think I can correct the above faults; and when I have done so, I will send you the formula, and every particular." It is a curious fact, that with all the numerous letters we have received, announcing that the writer has succeeded in taking photographs in natural colours, not one ever forwarded a specimen of the wonderful result claimed. The above letter forms no exception to this rule.

Young Amateur.—1. We will endeavour to supply the desired information shortly. A telescope object glass would not be suitable for photographic purposes, owing to the small field it would cover. It would, however, do better than a spectacle glass; and one of about fourteen inches focus would, doubtless, cover the field you require, viz., seven inches square. 2. You might succeed in taking interiors in March, with a single lens of 4½ in focus, on a dry plate; but you would have to expose during the middle of a fine day, and give a very prolonged time.

A. R. P.—1. The appearance is exactly similar to what would take place if you had used the chloride of sodium plate-cleaning liquid, and had not wiped the edges of the plate clean afterwards. 2. By consulting the index of our first volume you will find a very excellent solution for an alabastrine solution. 3. Add a little iodine to the collodion until it is of a sherry colour; this will improve it, but it will never be quite equal to collodion made expressly for positives. 4. The collodion is not sufficiently iodised.

A. R R. L.—The picture is so excessively indistinct, that if you have not made some great error in the focusing, the lens must be very inferior, the optical and visual foci not coinciding. You must try by experiment where is the point of greatest distinctness. An uncorrected lens requires to be pushed in a little, after having obtained the best visual focus, in order to get the chemical focus sharp; but your lens may be over-corrected.

New Subscriber.—In the collodion process the plate may be sensitised many days or weeks before exposure, as it is one of the great advantages of this and other dry processes, that the plate requires no preparation on the spot, but may be prepared and kept ready sensitive for a long time before it is required for use.

Glasguensis.—Theoride of silver is not at all easy to prepare, as, being soluble, it cannot be made by double decomposition between fluoride of potassium and nitrate of silver. You can make it by dissolving carbonate of silver in hydrofluoric acid. It ought to dissolve perfectly in a nitrate of silver bath.

Bottle.—1. An iodiser will remain good for an unlimited time, provided it is kept in a well-stoppered bottle. 2. Yellowish green bottles will do very well for preserving chemicals from the actinic rays of light. 3. Try methylic alcohol (*not* methylated spirits).

Beta.—The company you speak of is defunct. The pictures issued were almost entirely "touched up" with the graver, and cannot, therefore, approach in perfection Mr. Talbot's new process, which, as illustrated in our pages, was entirely untouched

W. Larchin.—Some of your chemicals must be at fault: perhaps your chloride of gold is impure, as you ought easily to obtain a black tone by Θ's process. Make a fresh solution, as the old one gets exhausted, and precipitate the gold from the latter.

G. E. Thysom will find a good description of a printing process in number 54. Any numbers which you have lost can be supplied by sending postage stamps for the amount to our publishing office.

An Old Subscriber.—1. "Archer's Transferring Varnish" can be readily made by dissolving gutta percha in benzol to the required consistency. 2. We will inquire.

Jules B.—We will forward the number. Sympathy is all we can give in your case, as, however much we disapprove of such dishonest practices as you have been the victim of, we cannot interfere.

Dry Plate.—We cannot give any public opinion upon the quality of the article mentioned in your letter; probably, we have met with very similar results to those you mention.

T. T.—The average exposure of the oxymel process is about twelve times that required by wet collodion. Coat the plate once with the undiluted syrup. It will keep good, if properly stoppered and kept cool.

B. L. O.—You can remove the crumpled appearance which *parchmentising* communicates to a photograph, by having it rolled or hot pressed. Any wholesale stationer will get this done for you at a moderate expense.

E. Lewis.—The slides, as a whole, are not good enough. We require a higher standard of excellence than they show to insert a name on the list.

M. N. P. S., who wrote on "The Fothergill Process" in a recent number.—We have a letter for this correspondent; to what address shall it be sent?

P. W. Jones.—There is too much acid either in your salt or developing solution.

A. M*****r.—We are much obliged for our correspondent's communication, but we do not think it would be applicable to our columns.

Medicus.—We can give no further information than what has been already published in our pages.

W. W. B.—Number forwarded. We have not tried the method, but have seen some very good things done in that way. It seems very precarious.

E. S. and G. W. Ferri.—Received.

F. R. S.—Refer to the index recently published.

Communications declined with thanks.—S. R. O.—Nostic.—A. B. C.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—O. W. S.—R. A. R. P.—Abracadabra.—Folly.—O. A. R. M.—G. Y. C.

In Type:—J. Walter.—H. N. Draper, F.C.S.—Geo. S. Penny.—W.—B. M. Brackenridge.—M. A. Root.—J. B.—W. B. B.—Amateur.—G. H. W.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

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BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

Many photographers—professional and amateur—have often a desire to use an ornamental and artistic background for positive portraits, groups, &c., and, as a painter is not always at hand to execute and arrange the same, we propose, by a series of illustrations and descriptions, to point out the method and manner whereby all so disposed may have a background to their command, at small cost, from the most simple, to those of more elaborate design and pretensions. The advantages of a background are many; it hides various defects in positive portraits in the shape of specks, flaws, and stains, and, provided the face be clear and safe, makes many a picture saleable, or presentable, that otherwise would be lost. Drapery, and ornamented backgrounds, if nicely tinted on the collodion side (especially for the portraits of ladies and children), may be made exceedingly rich and effective, with little trouble, by attending to the directions given in these articles.

Fig. 1.

Fig. 2.

A background may be from 6 to 12 feet square, according to the requirements of the party using it, and may be painted on a piece of two-yard wide Holland, or on a piece of prepared floor cloth, or on a wood frame covered with canvas, or on the wall itself.

The materials wanted will be a large and small brush, those called sash tools will do; a straight-edge to rule the lines with, made of a flat piece of deal about five feet long, three inches broad, half an inch thick, and bevelled on one edge, with an inch square block nailed on in centre to hold by, thus:—

some size, made by boiling a quarter-pound of glue in three pints of water till it is all melted; some Paris white, some lamp-black, or drop-black, some Vandyke brown, Indian red, and dark brown ochre.

After deciding on the dimensions of the background, and the material on which it shall be painted, strain the same tightly on a deal frame, or on a smooth wall, then put in a wash-hand basin about two pounds of Paris white, and mix up with water to the thickness of thick cream; when well mixed, put in a couple of large tea-cups full of hot size, rub some of it on a piece of paper, and dry before the fire; if it remains firm and set it will do, if it comes off, add more size till it sets perfectly firm; now, with the large brush, coat the background over smoothly and evenly with this composition, which is termed priming; let it now dry well and thoroughly; now grind up, or rub up with a knife on the back of an old plate or dish, if you have no slab, some lamp-black, or drop-black, or Vandyke brown (either of the three will do, but the Vandyke or drop is best); when rubbed up, place it in a pipkin or small pot, with as much

thin size as will make it flow freely and adhere to the primed cloth, and then, with the small brush, draw out, boldly and firmly, the design you intend, in strong outline, and rule in the lines with the straight edge, and let it well set and dry. Now mix a quantity, say one pound, of dark brown ochre in a wash-hand basin, as you did the priming, or you may add ochre and lamp-black to what priming you have left, and mix all well up with some more thin size; try on paper before the fire, and if it dries about the colour and tône of deep brown paper, it will do; then coat your background over, evenly and smoothly, as before, and let it dry out; if it does not dry dark enough to your mind, add more black to the mixture, and give it another coat; when dry, strengthen up the lines and shadows with Vandyke brown or drop black (*as in fig.* 2). The drapery and shadows of the same may be put in with deep red, but the background will be generally better and more easily executed if painted all through in neutral tint (either black or brown), like a large Indian ink drawing. The background, when dry, may be tacked on a lath or round wood pole, turned round, and the other side painted with a darker or lighter centre, as the case may be, to suit light or dark heads, white caps, &c. A makeshift background, without drapery, may be formed by straining a white cotton sheet tightly on a frame, and then pasting pieces of broad black tape, to form the lines and parallels (*as in fig.* 1). The backgrounds, when dry, can be taken from the wall or frame and tacked on a deal pole, to roll up and down.

THE PREPARATION OF GUN-COTTON.

BY M. VAN MONKHOVEN.

The following are the principal modes which have been proposed for the manufacture of pyroxyline:—

I. M. Meynier's process.—In a small porcelain vessel mix three volumes of monohydrated nitric acid, and five volumes of commercial sulphuric acid. The liquid being cool, some pieces of cotton are plunged therein until impregnated; after ten minutes of immersion, they are placed in a funnel over a glass vessel, and the liquid squeezed from it with a glass rod. The acid may be used in a subsequent operation by adding water thereto. The cotton, well washed in water and dried, then constitutes pyroxyline. The gun-cotton, thus obtained, possesses a highly explosive power, but this mode of preparation can scarcely be used because of the almost complete insolubility of the product.

II. M. Gaudin's process. — M. Gaudin communicates another method for preparing gun-cotton, very soluble in alcoholised ether, but not very explosive, yet in all its other characteristics the same as those of fulminating cotton. Into a drinking glass pour ninety grammes of colourless sulphuric acid of commerce; then introduce in small quantities sixty grammes of finely-powdered nitrate of potash (refined saltpetre); a homogeneous mixture having been formed, three grammes of the whitest and purest carded cotton wool should be completely immersed therein (it is well to wash it previously in distilled water, if it should be supposed to contain any soluble impurities, but it must be afterwards dried with the greatest care). The acid should well penetrate the fibres of the cotton, which may be accomplished by squeezing the latter in the liquid with a glass tube; the vessel should then be covered with a plate, in order to avoid the respiration of the nitrous vapours which are continually exhaled; the cotton should be allowed to soak in the acid for about ten minutes; it is, however, as well to lengthen this operation, because a more easily soluble pyroxyline is thereby obtained. The cotton forms a close and intimate mixture with the saltpetre and the sulphuric acid. When taken from the glass, it should be immediately placed in a large earthen pan of water, and well shaken, in order to dissolve the salts adhering to it; sometimes the saltpetre, or rather the sulphate of potash, adheres so closely to the fibres of the cotton, that we have commonly found traces of it remaining on the cotton, even after an immersion of ten hours in cold water. We therefore think it preferable, on the removal of the acid, to plunge the cotton into warm water, constantly stirring it; in this case, the cotton becomes pliable in five minutes. However this may be, on the attainment of this last result it should be submitted to a jet of water from a tap, the liquid being pressed out at intervals, so as to wash it thoroughly. This washing should be accomplished in the most perfect manner, for it is of the greatest importance that the acid, and especially the sulphate of potash, should be removed.

As it is extremely difficult to remove the acid remaining amongst the fibres of cotton, by means of simple washing in water, it is better to allow the cotton to remain in soak for an hour, in an alkaline water formed of 1,000 parts of water to 10 of ammonia—the alkaline waters are easily removed by two or three washings; and, lastly, the cotton should be immersed for some minutes in boiling rain water.

In the following manner, it may be ascertained whether the cotton has been sufficiently washed: the last washing water should be poured into a very clean vessel; soak therein, in the first place, some litmus paper, which, by its change of colour, will denote the slightest trace of acid, from blue it will become red; then pour upon it a solution of nitrate of baryta, if the liquor be rendered in the slightest degree turbid, there still remain traces of the sulphate of potash; in both these cases the washings must be continued. Finally, squeeze out the water, and spreading out the flakes of cotton, let them dry in the open air, and afterwards at a temperature of 100 degrees. The best mode of avoiding dust—a mode which also dispenses with any further increase of temperature—is to inclose the cotton in a tightly-shutting wooden box, in which has been placed a porcelain capsule, filled with fragments of very dry chloride of calcium; dust easily adheres to the damp gun-cotton, thus causing the collodion to be turbid; hence arise the spots often found in proofs during their immersion in the iron bath. Collodion, which presents, on being carefully examined by transparency, very light floating bodies, generally of dust, will always cause spots in the developing operation.

Gun-cotton is more soluble the higher is the temperature of the acid mixture, provided the latter does not exceed 100 degrees. It is also indispensable, in order to obtain good pyroxyline, that the cotton be plunged into the liquid as soon as the saltpetre has formed with the sulphuric acid a clear mixture, and the development of heat being more rapid in proportion as the reaction is more brisk, it follows that the saltpetre should be very finely pulverised. It is better to introduce the cotton by small portions at a time into the acid, for if it be all immersed at once, retaining, as it does, the air between its fibres, the liquid will be disturbed, and acrid vapours would arise which would give the acid a deep red colour; and if the operation be continued, a defective gun-cotton would be the result. Neither should pyroxyline be made in large quantities at a time; 45 grains are sufficient for an operation; still, several preparations in different glasses may be made, and all the washings may be executed at the same time.

III. Process of M. La Porte, of Roanne.—"The processes described for preparing this substance," says M. La Porte, "appear to me more or less bad and uncertain in their results. I have found the following invariably successful:—Into a well-dried glass or porcelain vessel put 100 grammes of nitrate of soda, with 300 grammes of sulphuric acid; stir the mixture with a glass rod; nitric acid vapours are discharged, and a tolerably strong heat is produced; cover the vessel and wait till the mixture is cool; then add 100 grammes of nitric acid; stir it again; when the liquid is nearly cold, add to it some pure carded cotton, in small portions of three to five grammes; let it be well saturated before adding any more; take it out after three hours of immersion, then wash it several times in water, until the washing water has no effect upon the blue litmus paper; dry it at a temperature rather below 100 degrees. If

you are not quite convinced that all the acid is removed, it would be prudent to allow the cotton to be steeped for some hours in a slightly ammoniacal water before drying. This process has the advantage of yielding a product invariably uniform, and is also very economical. The saturation of the cotton is more easily obtained; I have prolonged the immersion of the cotton in the acid bath for twelve hours, with the most perfect results.

Critical Notices.

Stereograms from Scotland. By Mr. Archibald Burns, Edinburgh.

THAT photography flourishes on the other side of the Tweed, we have long known; but it was not until a few days since that we were aware it existed in such perfection as we have evidence now before us to demonstrate. Our enlightenment on this subject proceeds from a series of stereoscopic pictures, which have been forwarded to us by Mr. Archibald Burns, who, if we may take these stereograms as a fair average specimen of his skill, deserves to take as high a rank among photographers as his celebrated namesake among poets. The sites from which the pictures have been taken have been selected with the eye of a skilled artist, and the manipulation is worthy of the highest praise. The plates were prepared by the Fothergill process, and the results are certainly not inferior to any obtained by the collodio-albumen.

We have two views of Burns' monument, one of which includes Arthur's Seat, the other Holyrood Palace, both of them remarkable for the sharpness and delicacy with which all the details are reproduced. In the former, we see the tops of the houses which lie in the valley between the monument and the lofty and precipitous crags, across the lower portion of which we can distinguish the footpaths worn by the pedestrian; in the latter, we have a view of Holyrood Palace calculated to give us a higher idea of its magnificence than we had before entertained; and whether we examine the foreground, the buildings, or the lofty hills which form the background of the pictures, we can find nothing to condemn. In the crags we see every fracture, and every little spot on the summits of the hills from which the grass has been worn away is as plainly distinguishable in the stereoscope as if the spectator were on the spot; the most perfect gradation of tone being evident throughout. As to the monument itself, we have as accurate an idea of what it is like as any inhabitant of the "gude auld toun," and we must confess that we have a much higher opinion of the skill with which the photographer has depicted it than of its merits in an architectural point of view.

In looking at the stereograms of Elgin Cathedral and Melrose Abbey, it is impossible to avoid a feeling of deep regret that such splendid edifices should have been suffered to fall into ruin. In the pictures of the remains of Elgin Cathedral we see the lofty, massive square towers, which from their appearance might well have induced those who saw them when the building was first opened for Christian worship to imagine that they would stand till the day when "the foundations of the earth shall be loosed." Many of the arches, which still remain to tell that the date of its erection goes back to the fifteenth century, retain the stone mullions intact, which, doubtless, formerly were filled with the stained glass with which our ancestors delighted to colour the luminous rays that entered the sacred buildings,their piety erected, at a sacrifice to themselves which we are incapable of imitating; while in others we see that they have been completely destroyed—more probably by the hand of man than by the slow operation of time. In fact, during the troubled times of Mary's reign it was roughly treated, and the Regent Morton actually caused the lead to be stripped off the roof to raise money to help to pay his soldiers in 1568, since which time the noble structure has been left to decay. As photographs, it would be impossible to produce any which could more truthfully and distinctly represent the present appearance of these ruins, from the lofty towers to the inscription on a tombstone, which informs us that it was erected by Robert M'Lennan to the memory of his son, William. Every portion is rendered with the accurate delineation of light and shade which could only be obtained by an excellent instrument and great manipulatory skill on the part of the photographer. One thing which surprises us, in looking at these pictures, is the crowded condition of the burial ground surrounding the ruins; the monuments to the memory of the dead appear literally to touch each other, and seem to indicate that it must have been used as a place of sepulture long subsequently to the time when the building was used as a place of worship. Even in the interior of the roofless building we see monumental slabs scattered about, commemorative of those who have found a resting-place within the sacred walls; the twin doorway, as Mr. Burns call it, through which we obtain this view of the interior, being itself a beautiful specimen of architectural skill.

We are told by Scott, that whoever

> "Would view fair Melrose aright,
> Should visit it by the pale moonlight.
> For the gay beams of lightsome day
> Gild but to flout the ruins grey."

But failing the opportunity of seeing the ruins of Melrose Abbey under the favourable circumstances indicated by the renowned writer whose lines we have quoted, we would advise all who have taste to appreciate the beautiful in art to see the pictures of them which Mr. Burns has placed within their reach.

The ruins of Melrose Abbey are of considerable extent, and attest the liberality of David I., who founded the abbey for a colony of Cistercian monks in 1136. The architectural decorations are most beautiful, and the majestic appearance of the ruins at the present day is abundantly manifest from the print before us, which gives a general representation of the ruins as seen from the south. From this point of view there is nothing, at the first glance, beyond the absence of the glass from the stone window frames, to indicate that we are not looking at a perfect building; it is only on close examination that we discern the grass and weeds which grow on the tops of the highest walls, and the destruction that has fallen upon certain of the minor architectural details. When, however, we come to examine the more enlarged views of the south entrance and the south aisle, we see more clearly the extent of the ruin which the hand of Time, with the assistance of man, has wrought. In truth, the religious zeal of the followers of John Knox is evident in the headless condition of the statues which occupy niches over the south entrance.

In the entrance to Glasgow Cathedral we have a fine photograph of a doorway, the picture also including a window which presents a peculiar appearance, such as we never remember to have observed in any picture before. This window happens to be exactly opposite another window at the other side of the cathedral, and the glass being deeply set in the stone frame received a greater amount of illumination from the inside than fell upon it externally; the consequence of this has been to give a most distinct representation of the glass, instead of leaving its existence to be imagined from its invisibility. Beneath this window stands a curious and very elaborate monument, bearing a Latin inscription surmounted by a monogram, and above this a death's-head and crossbones, with the scythe and similar emblems, which one seldom sees except on very old tombstones. The same peculiar effect, as regards the glass, is observable in the upper windows of Roslin Chapel over the south door, and from a similar cause.

The last of the series we have space to notice, is a view of a mass of rocks on the island of Inchkeith. The interest with which we look at this picture is perhaps heightened from the striking contrast it offers to those we have been examining. In the one case we have the elaborate work of men's hands, in the other the work of Nature—

> "Rocks piled on rocks in savage grandeur rise,"

so that one wonders how the photographer succeeded in reaching the spot from which the picture was taken. Not even in the views we have seen which were taken among the Swiss mountains do we remember to have observed any so wild and rugged as this of the rocks of Inchkeith; while, low down, in the extreme distance, the eye rests with pleasure upon the placid sea, which washes the base of a precipitous rock of great elevation.

Apart from their great beauty as photographs, few Englishmen could look at these pictures without feeling great interest in them, in consequence of the objects they depict—an interest which would be the greater, inasmuch as their distance renders it certain that comparatively few will ever visit the scenes in

which they are placed, while our knowledge of the associations connected with them gives them a peculiar charm in our estimation.

Photography Practically Treated.

BY ALEXANDER WATT.

THE COLLODION PROCESS—PRINTING FROM GLASS NEGATIVES. (*Continued.*)

The toning bath, when it has become exhausted, which may be known by its being unable to give the *purple* tones, should be set aside, and a fresh one made. The old bath, having accumulated silver, should not be thrown away, as the silver may be recovered when desired, by the processes described under the head of "Economy in Photographic Operations," published in this journal a short time ago; and, as only about five per cent. of silver actually remains upon the proof, the large proportion remaining in the toning bath is worth saving. In fact, the student will do well to observe the strictest economy in these operations, as he will naturally meet with a good many failures, or, at all events, indifferent results.

It has been said that albumenised paper will give brown or purple tones; it is also capable of yielding perfectly black tones, but it is not judicious to carry the printing and toning so far, as the whites of the picture will most likely suffer by turning yellow during the process of drying. If, however, it is wished to obtain the black tones, the process of printing must be carried to a somewhat greater extent.

There are other processes, however, for obtaining pure blacks without the liability of the whites being injured. This may be effected by the following method, it being the most simple and economical:—

It is conducted as follows:— Take of

Pure gelatine (isinglass)	1 grain.
Chloride of sodium (common salt)*	10 grains.
Water	1 ounce.

Dissolve the gelatine in about a drachm of boiling water; then add sufficient cold water to make one ounce of solution altogether. Now add the salt, and stir well until it is dissolved. It will be well, however, to make a good quantity of this solution, say 32 ounces, in the above proportions, as it is inexpensive.

The best paper for plain salting is either Canson's positive or negative paper (the latter, being rather thin, must be used with care), or papier saxe. The paper should be marked at one corner of its *smooth* side. This may be distinguished by holding the paper sideways, when, on one side, it will appear as if *crossed*, whilst the other (the right side) will be perfectly smooth. It will be better to cut the paper into sizes, equal to about four sixth-size negatives, or rather more. Each paper being marked at the corner will now be ready for the salting process.

Having prepared sufficient solution, immerse one sheet of paper, taking care that it be well covered all over, and all air bubbles dispersed. Then plunge into the solution the other sheets in the same way, until all the paper required to be salted is immersed. Now turn these over with the hand, placing the bottom sheets uppermost, and pin up by one corner to dry. In very cold weather it is better to dry these papers either in a warm room, or by the fire direct, as the surface is apt to be irregular when the gelatine dries slowly. As soon as the salted paper is perfectly dry, it may be placed between folds of stout cartridge paper so as to keep it flat.

In sensitising plain salted paper, it may be floated upon the 60-grain nitrate of silver bath; but, as it is more porous than albumenised paper, it need not remain longer upon the solution than from three to four minutes.

Plain salted paper is very liable to yield spotted, and otherwise defective proofs, unless it be kept free from moisture; and the greatest care must be observed not to allow the fingers to touch the marked side of the paper, lest any chemical substance should be upon them.

The printing process is conducted in the same way, as, with albumenised paper, it will be necessary, in order to obtain good black tones, to over-print to a somewhat greater extent; and it is advantageous, especially when the negative prints quickly, not to print in the sun, otherwise the whites of the picture are apt to become overdone, and no subsequent fixing will clear them.

* This should be recrystallised.

The most beautiful black tones are to be obtained, however, by the process termed the "Ammonio-nitrate Process," which consists in brushing the salted paper over with the following solution:—

Nitrate of silver (crystallised)	80 grains.
Distilled water	1 ounce.

The nitrate of silver must be dissolved in about half an ounce of water. When it is quite dissolved, drop in gradually strong liquid ammonia, stirring all the time with a glass rod. When the ammonia is added, a brownish precipitate is formed, which dissolves upon adding more ammonia. The ammonia must be added with great care towards the last, so as to prevent an excess being given. As soon as the solution appears quite clear, a few drops of nitrate of silver may be added to remove any excess of ammonia; this should render the solution somewhat turbid. Now add sufficient distilled water to make one ounce of solution altogether.

The ammonio-nitrate solution must be applied to the paper by brushing. This may be done thus:—Lay the paper, right side uppermost, upon a piece of blotting paper; then dip a sable hair brush (such brushes are sold for this purpose) or a tuft of cotton into the solution, and pass this to and fro upon the surface of the paper, so as to thoroughly wet one side. The paper may then be allowed to remain for a few minutes, to enable the solution to soak in, when it may be hung up by one corner to dry. Being highly sensitive, however, it must be carefully excluded from light; and it is not advisable to prepare much of this paper at a time, since it will become discoloured in a few hours. The solution of ammonio-nitrate should be well protected from the light, as it soon decomposes.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Cutting glass to oval or circular shapes, such as are required when glass positives are used for lockets, brooches, &c., is effected in two ways. As many photographers have an objection to transferring the film for this purpose, such transfer being generally somewhat degraded in tone by the process, and the process itself being often, as in case of alabastine pictures, quite inapplicable; the ability to cut the glass skilfully and safely to the proper shape, is—unless the preparation of mica known as the crystal medium be used—quite imperative.

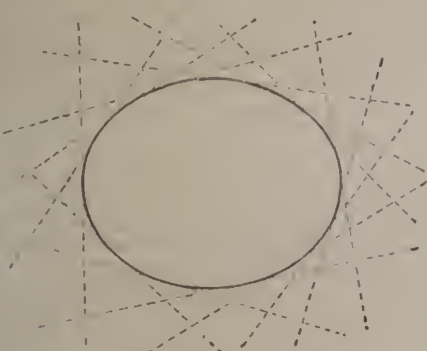
Glass may be cut to these shapes either by a diamond, or by means of heat. In using the latter method to cut a piece of glass containing a portrait great care is necessary not to injure the portrait. It may, however, be done successfully.

We ought to premise that the picture should be finished up to a certain point previous to cutting. If the picture have to be varnished but not coloured, it should be varnished previous to cutting, for it is obvious that a varnish could not be flooded on to the plate and drained off successfully after the glass had been cut to a proper shape. If the picture have to be coloured it may receive the first colouring and then be varnished, but the final colouring will be best left until after cutting to the required shape, as the dust and particles of glass falling on the picture during the trimming of the edges of the glass may then be safely brushed away without injuring the colour. These suggestions may appear almost too simple to be necessary; but we have often seen beginners—whose requirements we largely consider in writing these articles—commence to cut the glass either before it was varnished or after it was completely coloured, in either case involving themselves in a difficulty.

In using heat to divide the glass proceed as follows: Lay the box of the locket on the glass so as to bring the picture in the centre, and with a sharp point trace on the collodion film the proper shape; then take a lighted pastil, a piece of iron wire, or the stem of a tobacco pipe with the end made red-hot, whichever may be most convenient, and having made a slight notch or crack a little outside the marked shape, proceed to lead the crack in the required direction, as described in a former article. If the picture be varnished with a strong-bodied varnish it will somewhat interfere with the success of the process, and will also render it necessary to keep the incandescent point a little outside the mark, or the varnish on that part of the picture intended to be preserved may be injured by the heat

If the picture be unvarnished, or varnished with light-bodied varnish, the crack may be led in the line already marked with perfect safety. The hot wire should always be held so that its point will bo towards tho centre, in order that no part of the heated surface overhang the picture. If this be managed carefully and with a steady hand, the glass may be cut as nearly as possible to the proper size and shape at once. The edges will then be trimmed by the means to be hereafter described.

In using the diamond to cut glass to oval or circular shapes we may fairly assume that the amateur will wish to use the ordiuary cutting diamond of which he is already in possession. Glass cutters, we believe, generally use a diamond fitted expressly for the purpose, so as always to present its cutting point whilst describing a curve. A diamond fixed steadily in one position, immediately underneath which is a revolving table, on which is laid the glass to be cut, is also used for the purpose. But, with the expenditure of a little time and care, the amateur may, with his ordinary cutting diamond, effect all he requires. Having marked the oval or circle with the box of the locket as already described, a series of straight cuts are to be made intersecting every part of the circle or oval, somewhat in the fashion of the engraving, the dotted lines representing the cuts with the diamond:



The engraving represents an oval to be cut out of a plate of the ninth size, or 2¼in. by 2in.; it should be remembered, however, that as a large piece is more easily broken off when cut with a diamond than a small piece, giving, as it does, a better purchase for the fingers, it is always wise to use a plate of about an inch larger all round than the shape required. It will be seen in this method that one diamond cut continually intersects another, thus to some extent violating a rule we laid down in our last; namely, that the diamond should not be used twice in the same cut. In this case, however, that cannot be altogether avoided, but as much care as possible may be used to avoid pressing heavily whilst crossing the prior cuts.

When the various pieces cut in this way are broken off, the picture will present something of a polygonal form; the angles are to be removed by a method to be described in our next.

(*To be continued.*)

Photographic Chemistry.

HYDROGEN—(*continued*).

A FEW words on the subject of water in relation to its domestic uses, and we shall quit the subject.

Sea water, as our readers are aware, is wholly unfit for drinking, the result of swallowing it in any quantity being very pernicious. It may be made available for this purpose by distillation, but it is not agreeable to the taste, and, to render it so, it must be exposed to the atmosphere for some time, with frequent agitation. River waters are generally potable, though they invariably contain foreign substances, such as sulphates and carbonates of lime, magnesia &c., with the chlorides corresponding to these bases. It is the greater or less quantity of the salts of lime and magnesia which constitutes the degree of hardness of the water. This hardness is overcome by adding a sufficient quantity of carbonate of soda to precipitate the lime and magnesia, in the form of insoluble carbonates. For the same reason, it is advisable to add a little carbonate of soda to the water iu which vegetables are to be boiled, because otherwise the salts of limo and magnesia combine with certain bodies contained in the vegetable tissue, and form insoluble compounds, which are not removed by boiling. Spring waters contain more of these salts than river water, because they canuot exist without the presence of carbonic acid gas, which is given off in a great measure on contact with the atmosphere, as in a ruuning stream or lake, but which is generally to be found in great abundance in water freshly drawn from a well. It is to the presence of this gas that tho more palatable taste of spring water is owing, which quality it loses by exposure to the atmosphere. It must not be supposed that pure water is more wholesome for drinking than ordinary water; on the contrary, melted snow, which forms the water of many of the streams in mountainous countries, and which is nearly pure, is said to be productive of goitre.

BINOXIDE OF HYDROGEN, HO_2.

Hydrogen is capable of combining with a greater proportion of oxygen than is requisite to form water, and this is called *binoxide of hydrogen*, or *oxygenated water*. This substance is very difficult of preparation in the first place, and, when prepared, is difficult to keep. We have already shown that peroxides, of various substances, may be made to give off a portion of their oxygen, and be reduced to the condition of a protoxide by the action of acids. To prepare binoxide of hydrogen, the peroxide of barium is employed. This is rubbed with water, in a porcelain mortar, until it is brought to a liquid paste; it is then added, in small quantities at a time, to a solution composed of one part of ordinary hydrochloric acid in three parts of water, which is contained in a porcelain capsule in contact with ice. The solution must be stirred incessantly with a glass rod; the peroxide of barium gradually dissolves, without liberating the gas, chloride of barium is formed, and the oxygen combines with the water. When the hydrochloric acid is almost saturated with the baryta, a little sulphuric acid is added, which precipitates it in the form of an insoluble sulphate of baryta; the acid must be added by slow degrees after the first dose, in order that it may not be in excess; the liquid is then filtered through asbestos, and the residuum should be pressed, that no part of the solution may be wasted. The liquid is restored to the porcelain capsule, and a fresh quautity of peroxide of barium and hydrochloric acid is added; and the same process we have just described is gone through again and again, until the liquid is charged with binoxide of hydrogen. To get rid of the hydrochloric acid it coutains, sulphate of silver is added, in small quantities at a time, chloride of silver being precipitated, and sulphuric acid dissolved in the liquid, which is eliminated by the gradual addition of baryta-water; the liquid is then finally filtered, and placed under the exhausted receiver of an air-pump, over a capsule containing concentrated sulphuric acid. In this way it is possible to obtain binoxide of hydrogen quite pure. In this condition it is colourless, and possesses strong bleaching powers. It decomposes very readily on an increase of temperature, and oxygen is given off; it also parts with its oxygen to some metallic oxides, which it converts into peroxides, though, in the presence of some metals, it liberates the oxygen with effervescence, without effecting any change in them. It is also interesting to remark, that some of the easily reducible metallic oxides, on being immersed in oxygenated water, not only cause the escape of the oxygen from the water, but abandon the oxygen they possessed, and are restored to the metallic state.

Binoxide of hydrogen is composed of 1 part (by weight) of hydrogen to 16 of oxygen; or, in equivalents, 1 of hydrogen and 2 of oxygen.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 22*nd November*, 1859.

As far as optical science and photography are concerned, the most important news I have to send you to-day is the publication, in the last number of *Le Cosmos* (November 18th, 1859), of two new instruments which count among

the many ingenious inventions of M. Porro. The first of these is called a *Phanoscope*. Experiment has proved that if some very small writing be placed at the anterior focus of an ocular glass, to be viewed by transparency, there is a certain point or limit of distinctness, over which it is impossible to read the writing. If the written characters be replaced by a series of five or six micrometric wires of different thickness, it will be observed that these wires will disappear from the view of the observer one after another, as the light which illumines them diminishes; this phenomenon furnishes us at once with a criterion whereby we can judge with precision of the intensity of the light examined. Such is the principle upon which the first of these instruments has been constructed. It has an admirable application in the determination, by its means, of the intensity of the lamps of light-houses, signals, electric lights, &c. The second instrument is called a *Refraction Chromascope*. It is a portable apparatus, which serves to determine the nature of any light or flame by the examination of the luminous or obscure lines of the spectrum produced by the light examined. It is based upon the principle, that a light is the more luminous the more yellow and red rays it contains; less powerful lights containing more of the blue and violet beams.

M. Fizeau, a French physician, who is well known as the inventor of an ingenious apparatus for the determination of the velocity of light, has just presented to the Paris Academy of Science a memoir upon a subject which, it appears, has occupied him since the latter part of the year 1852, namely, *the optical demonstration of the translatory motion of the earth in its orbit*. The gyroscope of M. Léon Foucault and his pendulum experiment render visible the *diurnal* rotation of our planet. In the gyroscope we have a body which by rapid rotation is rendered a fixed point in space, and to which the earth in its daily rotation gives an *apparent* motion similar to its own. In the pendulum experiment, the plane of oscillation remaining fixed and always identical, the earth turns *under* this plane, so that if a pendulum be made to oscillate towards a window, for instance, in a few hours the directions of the oscillations will be found to have left the window, and the pendulum will be seen oscillating on one side of it; finally, in twenty-four hours, or after a complete rotation of the earth, the pendulum will be found oscillating towards the window again, as at the beginning of the experiment; the direction of the oscillations having made the circuit of the room whilst the earth had turned once upon its axis.

M. Fizeau has just brought optically into evidence, not the diurnal, but the annual motion of our planet. The phenomenon—in strict relation with the velocity of light, by which he renders evident the fact of the *addition* of the velocity of the earth's translation to the velocity of light, or of its *subtraction*—consists in the rotation of the plane of polarisation of a polarised ray of light passing through a refractive body. The deviation being very slight, it was necessary to multiply or augment it by a proper apparatus, consisting of rotative and magnifying piles of glass. Attentive observation through these piles, whilst the telescope which contains them is directed successively to the east or to the west at the time of the solstices, has shown that a difference in the rotation of the plane of polarisation really exists, and that this difference is always of the same nature, *i.e.*, in the same direction; moreover, that it is exactly what was to be expected from the translation of the earth in its orbit: so that the annual motion of the earth may be considered at the present day as having been optically demonstrated. For further details of these interesting experiments, I must refer your readers to the *Comptes Rendus* of the meeting of the Paris Academy on the 14th of November last. It appears from a passage in the first vol. of *Le Cosmos* of Paris, that MM. Arago and Babinet had already endeavoured to solve the same problem, but their experiments were always negative.

M. Perrot has presented to the French Academy a note, which has been the cause of considerable discussion: this discussion, however, has nothing whatever to do with M. Perrot's communication. The author in question demonstrates the rotation of the earth upon its axis by a new experiment. He takes a large basin or bucket full of water; at the bottom of the bucket is a small circular orifice which allows the liquid to escape; this orifice is exactly in the centre of the bucket. Now, whilst the water is running out, the particles of this liquid which leave the side of the vessel to gain the centre, do not follow a straight line, but undergo a slight deviation to the right; and some light powder or other being dispersed upon the surface of the liquid, renders this deviation evident. If a line of floating powder, for instance, be distributed upon the surface of the water so as to correspond with the radius of the circle, the borders of the vessel forming the circumference, it is found that this radius of floating particles does not remain straight, but, as the water runs out below, takes the form of a curve. In travelling towards the centre of the apparatus, these particles form, therefore, a curved line; on arriving near the centre they are seen to be considerably to the right of the position they would have occupied had they followed a straight line, *i.e.*, the radius. On arriving near the central point, they describe a spiral line, the direction of which, compared to the sides of the bucket, is also to the right. This deviation to the right of particles floating towards a centre is caused by the motion of the earth upon its axis.

When this experiment was presented to the Academy, M. Babinet reminded the members present of some curious facts observed formerly in the large rivers of Siberia, the Obi, the Yenisei, and the Lena, which flow towards the north. It has been remarked, in fact, that these rivers constantly eat away or enlarge their right bank; this encroachment cannot, however, be explained by any peculiar conformation of the ground over which they flow. Moreover, the fact is general for rivers in our hemisphere which flow from north to south, or from south to north, and, according to M. Foucault, the same may be said of rivers which flow in any direction. This is why the Nile carries its mud to the east, whilst the Rhone drives its sand to the west. In the other hemisphere all continuous currents of water have an impulsion towards the left. The same is seen regarding currents of air. In Cyclones the air flows towards a centre, and in doing so bears to the right, like the water in the experiment of M. Perrot; in the opposite hemisphere the reverse takes place,—the air in Cyclones bears to the left on its road to the centre; at the equator the effect is *nil*. These effects are owing to the rotation of the earth upon its axis.

This theory was attacked by M. Bertrand, and gave rise to a great deal of discussion between M. Bertrand and M. Babinet. The latter, however, came off victorious. M. Delaunay seconded the views of M. Babinet by a most able mathematical dissertation.

M. J. Fournet has found in the *Vallée des Roches*, in the Vosges mountains, a small quantity of chromic oxide encased in an immense vein. The samples he has collected are in every respect similar to those formerly discovered by the author in the quartz veins of the province of Lyons.

Dr. Carolus, of Brussels, informs me he has lately discovered a method of obtaining crystallised oxide of chrome. It consists in heating in a closed crucible for some time a mixture of equal parts of chloride of sodium and bichromate of potash. After cooling, the mass is washed with water, and the brilliant crystals of sesquioxide collected on a filter. These crystals have a metallic aspect, but give a bright green powder when pulverised. Crystallised oxide of iron may be obtained in the same manner.

Dr. Phipson has called attention to a new colouring matter extracted from the black thorn (*Rhamnus frangula*). A friend of the author brought to him some baskets in which the butter is brought from Brittany to the Paris markets. When these baskets are plunged into water, they communicate a brilliant yellow colour to the liquid, and, by proper treatment, they furnished a very remarkable colour-

ing matter. After some difficulty, it was found that the wood of which these baskets are constructed is that of the buckthorn (*Rhamnus frangula*), and the same colouring matter was soon after extracted by Dr. Phipson from the bark of the purgative buckthorn (*Rhamnus cathartica*). It appears that the same matter was observed by M. Buchner, of Munich, in the roots of *R. frangula* in 1853.

To obtain the colouring matter in a pure state, M. Phipson takes the branches of *R. frangula*, and leaves them for three or four days in sulphide of carbon. The sulphide soon takes a golden yellow colour. It is then evaporated, and the residue treated by alcohol, which dissolves the colouring matter and leaves a sort of brownish grease; the alcoholic solution is evaporated, and the residue dissolved in ether. This dissolution gives by spontaneous evaporation fine yellow crystals of the substance in question, to which the name of *Rhamnoxanthine* has been given.

Rhamnoxanthine is a ternary body belonging to the class of resins, or baumes. It can be volatilised like benzoic acid by the application of a moderate heat. With ammonia and the other alkalies, it gives a magnificent reddish purple solution. Acids bring these alkaline combinations back again to the primitive yellow colour. It is insoluble in water and in weak acids, soluble in alcohol, ether, sulphide of carbon, whence it is precipitated by water. It forms purple-red soluble compounds with alkalies, and gives differently coloured lakes with oxides of magnesia, zinc, alumina, &c. Finally, *Rhamnoxanthine* has more affinity for woollen tissues than for cotton, but can be fixed upon both. With concentrated sulphuric acid this yellow substance produces a beautiful green, which is decomposed, if the contact of the acid continue. M. Phipson has shown, in a subsequent note—to which I will refer hereafter—that this green colour, which is as brilliant as that of the emerald, is formed by an intimate mixture of dark brown and yellow. The dark brown substance, which is nearly black, results from the decomposing action of the acid upon the *Rhamnoxanthine*, whilst the yellow is furnished by the *Rhamnoxanthine* not yet decomposed.

M. Dumeril announces the safe arrival in Paris of an immense salamander (*Salamandra maxima*) from Japan, and of which there are only two living specimens in Europe; one at Leyden, the other at Amsterdam. This reptile measures 31 inches in length, and about 12 inches in diameter. The fossil bones, discovered by Scheuchzer, and thought by this geologist to belong to the human species, were shown by Cuvier to be those of a *Salamandra maxima*. Humboldt, in the 1st vol. of his *Cosmos*, thus speaks of these bones:—"Cuvier has found animals belonging to the existing families of the crocodile in the tertiary formation, and Scheuchzer's *antediluvian man* (*Homo diluvii testis*), a large salamander allied to the Axoloti which I brought with me from the large Mexican lakes, belongs to the most recent fresh-water formations of Œningen."

THROUGH JAPAN WITH A CAMERA.*

(*From our own Correspondent.*)

The greater part of the day was spent in photographing the inmates of the house where we had been domiciled, to their great astonishment, for not one of them could take their eyes from their portraits for more than two or three minutes at a time. I had an excellent opportunity here of getting some negatives of groups, of which I eagerly availed myself. The ladies were not at all unwilling that I should take their portraits, and grouped themselves in the manner I indicated with the utmost docility. With the women of a lower class, I had more difficulty; but I am disposed to think that this was owing to Dsetjuma not taking the trouble to explain matters to them so minutely as he had done to the others; so that it was not surprising that they should feel a certain degree of dread at submitting themselves to the mysterious effect produced by their being stared at for an instant by the great glass eye. I had a great deal more trouble with the men than with the women, because, to hide their nervousness, they would for a long time persist in fidgeting about, by way of showing how much they were at their ease; and when it had been sufficiently impressed upon them that they must remain perfectly motionless from the time when I removed the cap from the lens until I restored it, they made amends for the immobility of their bodies by giving the utmost degree of latitude to the action of their risible muscles, so that I have their faces, for the most part, with a grin upon them, which, if it gives one a high idea of their good temper, renders it difficult to distinguish their features. I have one exception to this, and it is a group which is not without interest in an artistic point of view. Upon the ground a woman is seated, knitting: beside her an infant is lying on a mat; and behind it kneels a man, of unusual size for a Japanese, who is intently looking at the infant; while a little fellow, about six or seven years old, is half hiding himself behind his father's arm, though I managed to get a good view of his face, and to keep him still by putting a heap of coins on the top of the camera, from which it seemed impossible for him to remove his eyes.

So long as we remained in the village all work was at an end; nobody would leave the spot where they could see the wonderful representations of themselves and each other, and loud were their exclamations of astonishment as they recognised some minute point of resemblance to the original which had escaped their attention at the first glance, and when these points of resemblance happened to be of a ludicrous character their laughter was unbounded. It was a real pleasure to see their happiness and excitement.

Having decided on quitting this place, the apparatus was duly packed, and the horses brought to the door; and after innumerable embraces (the Japanese understand kissing) we succeeded in getting away, in the midst of no end of good wishes, and, I fancy, some tears.

From this village we journeyed by easy stages to Stchoun, a larger and more important village than that we last quitted. Our way lay, for the most part, through fields, along narrow lanes, which would only just admit of the passage of the palanquin. The scenery was generally delightful, and several pictures we took on our way are as pleasing as any I ever saw, although we met with many more failures than I should like to acknowledge, if we had been working in Europe. As to Dsetjuma, he, novice like, thought every negative a good one, and watched the man washing off the film from the plate with a dejected countenance, and could scarcely be persuaded that a clean plate was more useful than one badly covered. It was fearfully hot work photographing during the middle part of the day, and except when the view was, for some reason or other, unusually interesting, I did not stop to take it; indeed, we generally went to sleep for two or three hours after lunch, while the men were getting their dinner.

The scenery, up to this point, has been very much like what I remember to have seen in your Isle of Wight; whichever way I looked, the view was bounded by hills at no great distance; but there was this difference between the two countries—that, whereas in the Isle of Wight, as in my own native land, one may see almost as much land covered with grass, and dotted with cows feeding, as is used in the growth of crops, here you see fields covered with cereals or other plants, or barrenness. You must not suppose there are no cows at all here, but they are few, and the reason is that the population is so dense that all the cultivable land is required for the growth of rice, or other grain essential to the maintenance of life; and so long as the Japanese continue to pursue their present exclusive system, there will be rather a diminution than an increase in the number of animals bred. I don't think, however, that this can possibly continue many years longer, unless a very bloody civil war should arise, inasmuch as the population will outgrow the

* Continued from vol. iii. p. 131.

means of subsistence, and it will be absolutely necessary to import rice, or other grain, to a very much greater extent than at present. It is true that the increase in the population is slightly checked in some overcrowded districts by the practice of infanticide; but this is not, as it is said to be in China, a recognised institution; on the contrary, the practice, when adopted, is performed secretly, and with as much precaution against exciting suspicion as if they had the fear of an official inquiry before their eyes; but when the time arrives that the mass of the population find themselves suffering from scarcity of food, I have little doubt that that which is now a comparatively rare occurrence will become common, and the only way in which it can be checked will be by encouraging the importation of grain, and the nation which is in the best position to supply this article will get the principal portion of the foreign commerce of the country in their hands. I have had a good deal of conversation with Dsetjuma on this point already, caused by what I have seen of the density of the population, and their mode of living. The masses live almost entirely on rice and lentils, and it is certainly a good argument in favour of an exclusively vegetable diet that they are, for the most part, healthy and vigorous; but, as I have already remarked, the productive capabilities of the land is, as far as I have been able to judge, pushed to its extreme limit already.

(*To be continued.*)

Proceedings of Societies.

South London Photographic Society.

The November meeting of the above promising young Society was held on the evening of Thursday, the 17th, the Rev. F. F. Statham, F.G.S., President, in the Chair.

The Chairman, having laid before the meeting a programme of the evening's proceedings, called upon the Secretary to read the minute; after these were confirmed, several donations were acknowledged.

Mr. Leak, jun., presented the Society with an ingenious portfolio, and stated that if the gentlemen present would only fill it, he would have another ready to present at the next meeting; he also placed within the folio its first photographs, as an additional gift.

Mr. Hannaford gave several specimens of various printing processes.

Mr. Howard added half a dozen very beautiful stereograms, as specimens of the Fothergill process, and

Messrs. Cotton and Wall exhibited a few other photographs—portraits, copies of prints and paintings.

Mr. Wall, the Hon. Secretary, pointed out the various articles exhibited in the room, among which were—

A camera stand, for out-door work, exhibited by Mr. F. Howard. Some very fine stereograms (Fothergill process), taken by Mr. Archibald Burns, of Edinburgh, and exhibited, with a number of other curious and interesting slides, by the Secretary. A new, singularly portable, and very complete stereoscopic camera, and dark slides for the dry process, by Mr. Clarke. A very light camera, portable, and capable of being packed into a very small compass (by the same gentleman), intended for large views. A very compact set of apparatus was brought forward by Mr. Hannaford, as used by himself for out-door work.

Mr. Smith, of 16, Mark Lane, exhibited a large collection of rare photographs, landscapes, architectural subjects, copies from paintings, prints, statuary, &c., taken by Fenton, Caldesi, Bingham, Melhuish, A. Watts, and others; a selection chosen with extreme taste and excellent judgment.

A photographic coloured negative copy from China, several stereoscopes, and other articles, were also exhibited.

Votes of thanks were awarded, severally and individually, to Messrs. Leak, Howard, Hannaford, Cotton, and Wall, for their prompt and kind donations, and also to the various exhibitors.

Mr. W. Ackland, Vice-President, then read a paper on—

The Difficulties of the Dry Processes.

I purpose this evening to attempt a description of some of the difficulties of the dry processes, and trust the discussion which follows may elicit some explanation of certain defects which sometimes occur, and yet scarcely admit of a lucid explanation.

Before commencing, I would remark that it is my intention to confine my observations principally to the collodio-albumen and Fothergill process, as those are more frequently employed by the amateur and professional photographer than any others.

The difficulties encountered in the dry processes are:—

Blistering.
Opaque lines in the excited collodion film.
Brain-like markings.
Reticulations.
Water-markings.
Fogging.
Want of intensity.
Insensitiveness.
Stripping off of the film.
Pin-holes in the high lights.

Blistering.—This defect seldom occurs in working Fothergill's process, but is often observed in the collodio-albumen, gelatine, and oxymel process, &c.; indeed, amateurs often assert, that if blistering could be obviated, the collodio-albumen would be the most certain of any known process. Many have attempted to explain the cause of this defect,—one writer ascribing it to dirty plates, another to employing a collodion containing too much ether, and a third too much alcohol, whilst a fourth ascribes all the annoyance to using the iodised albumen too thick.

Now, I propose to attempt no explanation, but to suggest a few precautions:—

These are—Never coat a plate in a damp room.

Slightly warm the glass plate before pouring on the collodion.

Let the collodion set until the drop at the lowest corner drained from will receive the impression of the finger before lowering the plate into the bath.

Prepare the iodised albumen from eggs about a week old, in preference to those new laid.

And to dry the plate most thoroughly after the albumen solution is applied, and take especial care to prevent it becoming again damp before the final exciting.

The collodion may be deemed the great cause of blistering, and to this we must turn our attention. This must possess fluidity, yield a creamy film, and be adherent to the glass plate. To ensure fluidity, it should be iodised a month before used, and if, when that time has elapsed, it still possesses glutinous properties, and yields blistering plates, we must produce the proper state of fluidity by the use of an alkali added to it. The best plan to effect this is to add to each pint of the iodised collodion about half an ounce of recently and highly-dried carbonate of soda, and to shake frequently during two hours. Then let it rest for another two hours, and pour off the upper clear portion into a perfectly dry bottle for use. To ensure a good creamy film the collodion must be iodised with a mixture of iodide of cadmium and iodide of potassium, and should contain at least six grains of the mixed salts to each ounce.

The adherence to the plate is somewhat dependent on the temperature at which the pyroxyline is prepared, for, although very high temperatures have been recommended, it is found advisable in practice not to exceed 150° F. in preparing this substance for the dry process. The collodion mentioned above being highly iodised requires an exciting bath, containing not less than thirty-five or forty grains of nitrate of silver to each ounce, and should be very slightly acidified with acetic acid.

Opaque lines in the excited film is the next defect. These lines occur in the direction of the dip of the plate, and may be traced to one or more of three causes:—

1st. To the plate being immersed in the bath before the film has been allowed to set sufficiently.

2nd. To the exciting bath being too weak, and

3rd. To the accumulation of alcohol and ether in the bath.

This latter cause is one of very frequent occurrence, and is certain to give rise to such lines, more especially if the bath solution is not of full strength. The remedy is to neutralise any free acid that may be present by carbonate of soda, and then to boil in a porcelain capsule for half an hour, so as to expel the volatile portion, and, when cold, to filter slightly, acidify, and dilute if necessary.

To ascertain if dilution is necessary, a bath tester should be employed. This is simply a glass tube about ten inches long and half an inch in diameter, with a scale of divisions commencing with 0 near the bottom, and extending to 100 near the top. To use it we must proceed as follows. [The bath tester was produced and handed round]:—

Take of highly dried and perfectly pure chloride of sodium 84½ grains, and dissolve it in 20 ounces of distilled water. This forms the test solution, and requires to be made with exactness, or the result obtained by its use will be erroneous. A second solution is also needed; this is made by dissolving 20 grains of bichromate of potash in one ounce of water.

To test the strength of a bath solution, take the bath tester and

drop into it one drop only of bichromate of potash solution, then fill the tube up to the lowest division, marked 0, with the bath solution, and add the standard test solution, gradually shaking at frequent intervals. When the colour of the precipitate, which was at first brick red, changes to a lighter tint, add the test solution more gradually, and continue to shake up between each addition. Continue to add the test solution, drop by drop, until the red tint of the precipitate suddenly changes to white, showing that all the nitrate of silver is decomposed, and that enough test solution has been added. Now read off the division on the level with the surface of the fluid in the bath tester, and it will be equal to the number of grains of nitrate of silver contained in each ounce of the bath solution. Thus, supposing, after having performed the experiment, the fluid in the bath tester stood level with the 39th division (counting from below upwards, the same as the tube is figured), this would indicate that each ounce of the bath solution tested contained 39 grains of nitrate of silver.

This plan of using bichromate of potash, to show by a change of colour when all the nitrate of silver is converted into chloride, was published some years since, and, although but little used, answers perfectly in all cases except to test the nitrate of silver bath, after having been used to excite collodio-albumen plates. In this case, the precipitate which forms on adding the test solution remains coloured, however much is added; therefore the use of the bichromate of potash solution must here be dispensed with, and the test solution added, gradually shaking after each addition, and allowing the white chloride of silver which is found to settle down, until the test solution ceases to produce any more cloudiness in the clear portion of the contents. The division, level with the surface of the fluid in the bath tester, here also indicates the number of grains of chloride of silver per ounce.

Reticulations, or crape-like markings in the film, arise from a defective sample of collodion being employed, or it may be caused by using a small quantity of collodion to coat a number of plates, as in hot weather the evaporation of the ether leaves the collodion in a condition to give these markings, but may be prevented in this case by adding a few drops of ether from time to time to supply the loss of evaporation. A collodion prone to these reticulations may often be made to give a uniform film by adding to each ounce eight or ten drops of chloroform.

Marblings, or brain-like markings, in the high lights of a negative often occur, and may be traced to a defect in the collodion, careless development, or partial washing after exciting.

Collodion yielding a compact film is very liable to possess this defect, and should be at once discarded for one of a more porous nature. Indeed, I may here remark that a compact film is totally unfit for use in any dry process, and is the cause of many of our failures.

Carelessness in imperfectly mixing the pyrogallic and nitrate-developing solutions is often a source of these markings, as is also unequal washing after removal of the excited film from the nitrate bath, and the remedy is now of course apparent.

Water Markings.—These have been described by a writer in the "Photographic News" as occurring chiefly in the skies, but occasionally in other parts of the picture, and are of all shapes and forms; sometimes (on a minute scale) very like what are called, in silks and other fabrics, "water markings" and at others, patches of varying length and breadth, either ending abruptly or shading off gradually into the upper edge of the film.

These markings were a constant source of annoyance to me in my earlier attempts at Fothergill's process, but, at last, I succeeded in discovering the cause—viz., using a collodion yielding too compact a film. By constantly using Powell's collodion, of late I have not seen a single marking, and, in order to prepare a specimen of this defect to submit to your notice, it became absolutely necessary for me to prepare a collodion on purpose, and, as you see, my success has been very great, for the plate now handed round is one of the worst cases of this kind of marking that can possibly occur.

The remedy is here, as in the last case, to use a porous film, for however carefully you may wash your plate, whether in four drachms, one ounce, or four ounces, on applying the albumen to a plate coated with a compact film, these defects will at once form, and, on the plate becoming dry, be very apparent.

Fogging occurs in the "dry process" in a somewhat similar manner to the same appearance in the "wet," and may arise from the state of the bath, over-exposure, diffused light, excessive heat, vapours or gases in the operating room, &c.

It is sometimes found that a bath solution, after being used to excite a number of plates, will yield foggy pictures, although, on testing the fluid, it is slightly, and as at first, of the proper strength.

How to proceed here is a difficulty not easily overcome. The only plan likely to be successful is to add carbonate of soda until an alkaline reaction is produced, then to filter, and render the filtered liquid slightly acid by acetic acid; should this fail, making a new bath will save both your patience and your pocket.

Over exposure is sometimes the cause of fogging, especially when the temperature is high. Here our course of action is apparent. Excessive temperature in the operating room will often give rise to fogging, and it is one of the many difficulties met with in a hot climate. Still with care we may prevent it, by diluting the collodion with one part alcohol and two parts ether, by an increase in the amount of washing the film after exciting, and by diluting the albumen mixture with one-third and the developing solution with an equal bulk of water.

Diffused light in the operating room is certain to cause "fogging." To test if the operating room is sufficiently free from actinic light, expose an unwashed and excited plate in the room, near the source of light, for eight or ten minutes, then pour on the developing solution for half a minute, wash and fix with hypo. Should the room admit no actinic light, and the bath be in good condition, the plate will be quite transparent; but if a foggy deposit has taken place, the room or the bath is at fault, and, if the former, an increased thickness of yellow calico or another pane of yellow glass must be used.

The vapour of ammonia or sulphuretted hydrogen in the operating room is often the cause of fogging, and must at all times be most carefully guarded against.

Want of Intensity.—This may arise from many causes. The most frequent in Fothergill's process are, defective bath, too much washing after the exciting bath, and over-exposure.

A defective bath often gives rise to a want of intensity, due to an unknown change which sometimes takes place in the bath solution; and as no remedy is at present known, the employment of a new bath is the only chance of success.

Too much washing after exciting often gives rise to a want of intensity in the resulting negative, more especially if the collodion employed yields a compact film, and for this reason it also appears advisable to use a porous film, heavily charged with iodide. An excited plate, stereoscopic size, coated with Powell's collodion, is, I find, sufficiently washed with six drachms of water, whereas a compact film requires a much larger quantity, and there is more danger of the washing being carried too far.

Insensitiveness.—This fatal difficulty arises from the employment of a very acid or unsuitable collodion. The bath should contain (as before stated) forty grains of nitrate of silver, and give a very slight acid reaction to test paper. To avoid "insensitiveness," or want of uniform sensibility, I adopt the following plan: Supposing two dozen plates of first-rate quality were required. We should here require at least four ounces of iodised collodion, and twenty-four ounces of bath solution, and test these by taking a view near the operating room, by the "wet process;" if these worked satisfactorily, fill the bath (holding, say twelve ounces) with bath solution, and pour off two ounces of the iodised collodion into a clean four-ounce bottle, and use this to coat and excite the plates, then add to the remainder of the two ounces of collodion about twenty drops of ether (more or less according to temperature), and coat and excite six more plates. Having coated and excited these twelve plates with the two ounces of collodion and twelve ounces of bath solution, it is advisable to turn out the collodion and bath solution into stock bottles for further use after being tested, and to coat the second dozen of plates with another two ounces of collodion, and excite them in a fresh quantity of bath solution, of course taking care to add a small quantity of ether to the collodion, after coating six plates as before.

This plan ensures uniformity, and is not more expensive in the end than if we attempt to economise by using a limited supply of collodion and bath solution, as the collodion and bath solution may be again used, the former after being slightly diluted with ether, and the latter after being strengthened if needed.

Striping off of the Film.—It sometimes happens on fixing a negative by many of the dry processes, that the film becomes detached from the glass, and slips off in washing. To avoid this, take a small-sized camel's hair pencil, and tie it to a thin slip of wood, so that the latter may project about a quarter of an inch below the brush. Dip the brush so prepared into your bottle of negative varnish, and then, holding it upright, and using the projecting slip of wood as a guide, carry the brush round the four edges of the plate, so as to leave a film of varnish about one-eighth of an inch all round.

This brush requires to be kept in a separate bottle, containing a little alcohol, in order to prevent the varnish on it becoming hard and dry, and thus rendering it unfit for use.

The film of Fothergill's plates sometimes peels up at the edge on the final drying before varnishing, and as this defect often accompanies a good collodion, we must prevent it by an extra roughening of the edges of the glass with a corundum file [the instrument was here exhibited], and when the plate is dry after exciting, varnish around the edges as before described.

Pin-holes in the Skies.—These minute holes sometimes exist to such an extent as to spoil an otherwise good negative, and may be prevented by fully saturating the bath solution with iodide of silver, and avoiding a collodion iodised with impure iodide of potassium, and using very carefully filtered developing solutions.

Mr. Ackland resumed his seat amidst expressions of applause.

The President rose to thank Mr. Ackland for so very useful a paper. He had been pleased to hear of difficulties rather than impossibilities, and to know that the defects were

not without remedies. The specimens of the various defects which the Vice-President had provided to illustrate his remarks, were, he thought, wisely produced, inasmuch as, being seen, they would be more readily recognised at any future time by amateurs in the dry process, when the remedies and precautions Mr. Ackland suggested would doubtless prove of great service. To know an enemy was a good way towards vanquishing him. Having run over the memoranda he had taken, to give in one view the character, &c., of the various difficulties, the hon. gentleman said the references which had been made to some of the photographic publications proved their great value; and concluded by awarding to Mr. Ackland the usual vote of thanks.

Mr. F. Howard: Mr. Ackland's paper was, in his opinion, an invaluable one, pointing out, as it did, means of removing the many difficulties which beset the dry collodion worker. He would venture to make a few remarks. First, with regard to blistering, he would state that, judging by his own experience, it proceeded invariably (he practised Fothergill's, and not the collodio-albumen process) from using the glass when it was not perfectly dry. He would therefore advise operators not to be content with merely cleaning their plates well before using, as, after being put by, they required friction (or warming), to remove what he might term an imperceptible moisture, which glass was apt to retain, even when kept in a dry room. The breathing upon the glass ought always to be succeeded by brisk rubbing, as a means of warming the plate. As regards water-markings, which were among the greatest obstacles to successful results in Fothergill's process, he had succeeded in entirely removing them. He had found, in the course of numerous experiments with various collodions, that these markings invariably occurred with greater distinctness on one-half of his stereoscopic plates than the other, and that that half was the one over which the albumen last travelled. It then occurred to him that the albumen, when applied after washing the plate, had sufficient density to push all moisture before it to a certain point about two-thirds the length of the plate, when, becoming diluted and no longer able to assert its supremacy from that point, an uneven coating was formed and the markings began. To avoid them he proceeded in the following manner:—After the plate had been removed from the bath, washed, and drained for half a minute, he applied the albumen along the long edge of the plate, allowing it to travel slowly right across. It thus had only 3¼ ins. to pass over instead of 6¾ ins., and he found that by so doing he overcame the annoyance. Mr. Howard also stated that he could produce good pictures with any good negative collodion, want of sensitiveness being the only drawback to the use of such as were not specially prepared for the dry process. With regard to the splitting of the film after fixing, it was caused, he thought, by drying too quickly in a current of air or near a fire. Washing off he prevented by running round the edge after drying, and before exposure, a brush dipped in albumen. He would advise practical workers of the Fothergill process not to discard a good negative collodion simply because it was not prepared for the purpose. If a good wet negative could be got by the collodion and bath, a good dry one, with careful manipulation, could be likewise ensured.

Mr. Smith made some remarks regarding the use of gutta percha baths.

Mr. Hannaford remarked, that one reason for the blistering which occurred in the collodio-albumen process was, that the albumen and collodion films expanded in different degrees on being covered with the developer. Great care should also be used in the selection of collodion. Coating the plate entirely with albumen before applying collodion, would prevent non-adhesiveness, and also to some extent blistering. Water-markings, &c. in the Fothergill process arose most frequently, in his opinion, from not using the albumen sufficiently diluted; he found the white of an egg in half a pint of water quite enough. Marbling from careless development would be to a great extent prevented, if the plan suggested by Mr. Burnett should be found to answer. He should allude to it in a jotting he had prepared for this evening, which, as it related to the subject under discussion, he might be permitted to read. Mr. Hannaford then read as follows:—

I am of opinion that the great want of success in employing dry plates, is in carelessly washing them. The following plan I like best of all I have tried:—The collodion should contain a bromide, and, perhaps, a chloride, in addition to an iodide, for reasons which will presently be seen. The plate, after sensitising, is dipped into a pan of water, and moved about so as to remove *and save* the greater part of the free nitrate of silver, and afterwards washed in an unlimited quantity of water under the tap. It is then coated with the following, and washed as before:—

Water	half a pint.
White of one egg	quantities immaterial.
Iodide of potassium	
Bromide of potassium	
Chloride of potassium	

The plates in this state are quite insensitive to light, and will keep any length of time. The operation, so far, may be conducted in broad daylight—a great boon for those who have not an unlimited supply of water in their operating room. To sensitise the plates, immerse them in a very weak silver solution—the first washing, for instance—or re-dip in the silver bath, and thoroughly wash. So far this is only a modification of the collodio-albumen process, in which there is nothing new. The plates in this state will not keep any length of time. This is owing to the presence of free nitrate of silver, for to be sensitive the plates must have a considerable quantity of free silver present, but it need not be the *nitrate* or any other soluble salt. Bromide, chloride, acetate, citrate, oxalate, &c., answer equally well, as regards sensitiveness, and far better as regards keeping qualities, and therefore it will be found that, by immersing the sensitised plates in dilute acetate of soda, or chloride of sodium, and afterwards washing them, we are enabled, without risk, to have much more silver on them than when it is in the form of a soluble salt.

After some further discussion, in which Messrs. Barnett, Martin, Hannaford, Hervé, Leake, and Howard took part,

The President called upon Mr. Hannaford for his promised paper.

Mr. Hannaford said—As there are very many matters constantly recurring in every one's photographic experience which, without being of sufficient consequence to form one entire paper, are yet worthy of being jotted down, I bring you the first instalment of a series of short papers to be introduced from time to time by one or another member under the head of "Photographic Jottings." The first I will offer is upon—

CARBON PRINTING.

M. Asser, of Amsterdam, has recently published a process of printing in lithographic ink. I will shortly state it, for the benefit of those who may not have read his instructions. He coats paper unsized or sized by starch, with a solution of bichromate of potassa, exposes it when dry under a negative, and fixes the picture by washing in water. After heating it on a piece of hot marble with a flat iron, he saturates the paper with water, and passes a roller charged with printing ink over it. Now, the reduced bichromate on the paper is found to have an affinity for grease, whereas water, of course, repels it; consequently, the ink from the roller adheres only to the bichromate, thus forming the picture.

Mr. Shadbolt, in his journal of the 15th inst., in noticing this process, states that he has for some time entertained a scheme founded upon one of the photo-lithographic processes. In substance, it is the same as that of Mr. Asser.

I have not had time, since the publication, to try either of the above, but I will give you the result of some experiments I made last year in a similar direction.

Mr. Sutton once stated that if a piece of paper be coated with gelatine, and a roller charged with printing ink passed over it, on after-immersion in water the whole of the ink would come off and the paper appear quite clear. Acting on this hint, I took a sheet prepared for iron printing, that is, coated with bichromate of potassa, ammonia, acetate of iron, and albumen—I employed this because I had it by me—and after exposure under the negative, gave it a coating of printing ink before fixing in water. But although I succeeded in getting the high lights perfectly clean, and, indeed, produced a very fair copy of an engraving, I could not manage the half tones. A little perseverance might have overcome the difficulty, and I purpose renewing my experiments. In a second case, instead of ink, I used plumbago, blackening the paper with it after exposure, but was not over-successful. The following plan answered better:—The sensitising mixture had sufficient albumen, gelatine, or gum with it to give a glaze when dry. Exposing and fixing in water, as before described, I obtained a print sized in the parts which had come under the influence of light, but unsized in those portions protected from it. When dry it was coated with plumbago by the help of a soft stump. Holding before the steam from a kettle caused the size to retain the blacklead in contact with it, whereas the whites being perfectly unsized, the plumbago was easily removed therefrom by using stale bread; friction is, however, objectionable.

I will now offer a few suggestions respecting the above process of M. Asser. In the first place, it will require delicate handling, to say the least, to pass an inked roller over plain paper saturated with water, so that no ink may adhere to it. Perhaps first soaking it in

strong alkali, so as to remove any substance having an affinity for grease, would be an advantage. Finger marks, for instance, might be imperceptible to the eye, but they would show as soon as they came in contact with the ink. This difficulty, if, indeed, it proves one, practically would refer more to Mr. Shadbolt's process than to that of M. Asser; for the latter surface-sizes his paper with starch, which appears a matter of some importance. If used very thick, so as to form a crust on the paper, it would have more the properties of photographic stone.

The graduated drawing-boards, sold by artist's colourmen, have a surface of body colour which might render them of use in this process; they may be procured plain, of a very light colour.

One hint more, and I have done with the subject for the present. Lithographic printers are in the habit of mixing pure gum arabic with the water to keep the stone damp, as it is found to repel grease much more completely than water alone. It might be advantageous to add gum, and, perhaps, a little nitric acid to the water, with which the paper is kept saturated whilst being inked.

Photo-Engraving.—As hints on this subject are always acceptable, I give the following very rough jotting of a process by which, I think, something may be done:—Last spring I coated a steel plate with the iron solution used in my iron-printing process; bichromate of potassa and gelatine answer the same purpose; the exposed plate was immersed into nitrate of silver, when chromate of silver was found on the parts which had not been acted on by light. The plate could now be bitten into by acids—hydrochloric, for instance. If, instead of steel, a copper plate be used, and after immersing in the silver it be washed so as to remove the film, an impression is obtained somewhat resembling a daguerreotype, reduced silver giving the shadows, and the unaltered copper the lights.

Mr. Howard: As regards the want of half tones in the method of carbon printing alluded to by Mr. Hannaford, having had considerable lithographic experience, he could say that half tones were not to be produced on a smooth surface. If you pass the lithographic roller over any smooth surface the ink must adhere to all parts in a uniform manner; that it was necessary in lithography, if you wanted half tones, to have a roughened or granulated surface, as the ink then only adhered to the projecting and prominent portions forming a series of irregular dots.

Mr. Wall would venture to put forward a singular fact as another "jotting," which in these days, when photographic portraits are received in our courts of law as evidence to prove identity, might not be unimportant, although he would not for an instant infer that such evidence should be doubted. The two photographic portraits he now placed before them were beyond doubt of two perfectly different men, and yet they were so alike that he had much difficulty of convincing many of the fact.

Mr. Leake said, although the hour of adjournment had already come and gone, he would, with permission, detain the meeting a few minutes longer, as he had a communication to make which might prove important. He had been much annoyed by a new sample of glass (patent plate) called German. His usual cleaning solution, consisting of cyanide of potassium and tripoli, had not the least effect, and another plate-cleaning solution, warranted to clean anything, was equally impotent. Both these solutions were perfectly effective with other glasses. He found also that the exposure was, with this glass, much longer. A deposit made its appearance between the glasses and the collodion during development, and the picture produced was misty and full of stains. Moreover, after drying, the film in most instances split off from the plate. He had tried experiments with the same cleaning solution, bath, and developer, on the same day, using other glasses with excellent results.

Mr. Wall said he understood that there was a large and increasing demand for the glass in question; the wholesale houses were buying largely. In his own establishment they had willingly purchased, for it was cheaper and, to all appearance, better than they had previously obtained. The matter, therefore, was one of importance. As he had witnessed Mr. Leake's experiments, he could vouch for their accuracy.

Mr. Hervé stated that he once met with similar difficulties from purchasing a glass called in the trade "jam glass," and made in Germany. He attributed it to the presence of lead in the formation of the glass.

The President suggested an experiment to test the specific gravity of various specimens with reference to their photographic qualities, and then announced for the next meeting, on Thursday, December 15th, a paper entitled "Practical Observations upon Photographic Productions in their relation to Art," by Alfred H. Wall, Hon. Sec.

Mr. Leake promised to fill up any space which might be left unoccupied by bringing down a few more "jottings."

The following gentlemen were then elected:—Mr. J. Williams, Mr. T. Clarke, Mr. G. S. Tear, Mr. W. Lovett, and Mr. J. Martin.

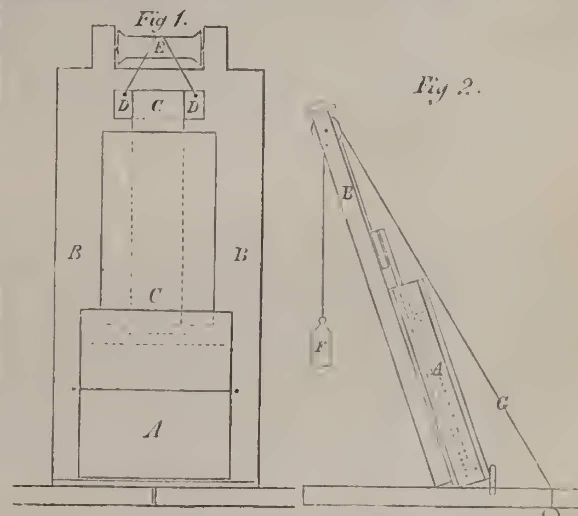
Mr. Hervé proposed a vote of thanks to the Chairman, which was heartily awarded.

The meeting then adjourned.

Photographic Notes and Queries.

IMPROVED SILVER BATH.

Sir,—I beg to inclose a sketch of a nitrate of silver bath. By this arrangement the operation of sensitising is rendered certain and easy to the most inexperienced, and many mishaps which occur, when done in the usual way by hand, are obviated.



The bath A, fig. 1, glass or gutta percha, is fixed to the board B by a cord passing through two holes in the latter; to the glass dipper C is cemented the cross piece of wood D of the same thickness as the side of the bath; to it are attached two cords which pass over the roller E, uniting behind, and attached to a counterpoise F, shown in the side view, fig. 2, of sufficient weight to suspend the dipper and plate in the position shown in fig. 1, the counterpoise then resting on a shelf, on which it may most conveniently be placed. As shown in fig. 2, the bath leans back to the wall, to the counterpoise is affixed a third cord G, also passing over the roller, for the purpose of raising and depressing the dipper.

The plate, having received the collodion film, is laid upon the dipper, and is then steadily immersed into the solution by pulling the string G until it is felt that it has reached the bottom, in which position it is retained as long as necessary, by slipping the end of the cord at the ring into a slit in the edge of the shelf. J. B.

THE OXYMEL PROCESS.

Sir,—The manipulations, &c., of the oxymel process, as I practise it, do not materially differ from those usually employed. I use common water to wash the sensitised plate (which water contains iron, evidenced by the deposit at the bottom of a glass, if at rest for an hour or two). The washing is done in a porcelain tray by immersing the plate, and tilting the tray up and down fifteen times, pouring off the water and refilling the tray with fresh, tilting ten times, and pouring away; next, immersing it in the oxymel bath, tilting up and down ten times top and bottom, and ten times side to side of the plate, which is then raised out, drained an hour or two, and stowed away in a mahogany

plate box. With a 7 × 6 single lens, $\frac{5}{8}$ inch stop, the exposure for the view I sent you was (at $7\frac{1}{4}$, a.m., early last September) five minutes (no direct sunshine). It was developed by first rinsing off the oxymel in the tray, and applying a solution of pyrogallic acid, $1\frac{1}{2}$ grains to the ounce, with acetic acid (glacial) 20 drops and 30 grains, silver solution 10 drops. The collodion was Perry's negative, with Hardwich's iodiser; but I have been successful with various collodions, a "powdery" one giving the most *uniform* success, owing to the many washings required. Three days is the longest time I have kept the plates before using them, but it was in July.

I must conclude with a "notion" of a dark tent, which I don't recollect reading of in the "News." The usual tripod stand in position for taking a picture: lift up *one* leg to 8 inches from the ground, on it slide an elongation (by means of two ferrules to fit), of say 15 to 18 inches; put into the ground as before, and cover the stand with the usual light proof material, having a hole on one side, fitted with india rubber band to grasp, a round or square piece of yellow glass in a frame, the outside edge of which is deeply concave, the extra length of one leg increases the room internally to a great extent, the entrance being between the two shorter legs, and the glass illuminates the tent satisfactorily.

W. B. B.

HALO-LIKE APPEARANCE IN THE SKY OF A PICTURE.

Sir,—Knowing, as a reader of the "News," the interest you take in optical and photographic questions, I inclose you a print, a bad one, from a negative I lately took, the peculiar interest of which is, the uncommon appearance faintly visible in the sky, which I am puzzled to account for.

I will relate the circumstances of the case:—The pictures were taken with two lenses, but consecutively in the order marked, at about 9 a.m., Nov. 9th, the sun shining, but dimly, situated behind the camera, atmosphere rather foggy; each picture had about four minutes' exposure. The process was a modification of the oxymel, such as I am accustomed to work with, and I saw nothing unusual in the development of the plate.

The *prima-facie* view is that of a faint impression of the sun, with a halo round it, reflected in some way into the camera. This opinion is confirmed by observing, that in the second picture the image is not precisely in the same position as in the first, but is lower, and more to the right, relatively to the houses, corresponding to the motion of the sun upwards and to the left. I am not philosopher enough to know whether such an image is ever seen cast upon the sky, or the intervening mist. If it were so, why did I not see the appearance with my own eyes? I was by the side of my camera, and looking much in that direction.

Geo. S. Penny.

THE FOTHERGILL PROCESS.

Sir,—I shall be glad to know if any of your correspondents have met with the following phenomenon:—I have just developed a few views, taken a month ago in the Highlands of Scotland, by the Fothergill process; and, on moistening one of the plates with water, as usual, previous to developing, I was surprised to see the outline of the hills distinctly appear about three seconds after the water had gone over it; there were no details visible till the developer was poured on, but this did not intensify, or otherwise change, the outline of the hills in the least.

I should add, the plate for this view was exposed forty minutes at eleven a.m., and, during that time, there were two slight snow-storms, alternated with bright sunshine; and, during the fall of the snow, these hills were entirely shrouded from view by mist, which cleared off as suddenly as it came on.

I am anxious to know if any of your correspondents have been successful in producing a good, direct positive on glass by Fothergill's process. I think it has got to be proved that this is not feasible. A good formula for this would be a great boon to Amateur.

TO CORRESPONDENTS.

A Hint for Manufacturers.—A correspondent writes as follows:—"I have only *seen one* camera yet for the dry processes, out of the whole quantity advertised, and think, if you would suggest in the 'Photographic News' something as follows, it would suit the manufacturers quite as well as the amateur—viz.: Let a manufacturer of apparatus send specimens of his productions to the various large towns—say to Manchester—for a month, and advertise in the 'News' that they might be seen there at "So-and-so," from the —— to the ——. Then let them be packed up, and next sent to Leeds, or York, or Newcastle, for the same space of time, and advertised accordingly. By this means one set of apparatus might be *seen* by many photographers during the winter months; they would then judge for themselves as to which would suit them best, and order accordingly. Don't you think they would be likely to get more trade by this means?"

H.—We will insert the former part of our correspondent's letter, as it will be more likely to obtain the desired information. Respecting the query on stereoscopic cameras, we decidedly prefer a twin lens camera to any other form, as by this means only can pictures of moving objects be taken, and there is always the power of taking the pictures consecutively at a greater distance apart, by mounting the camera on parallel laths, or otherwise, and exposing one at a time. We think 4 inches apart, from centre to centre of the lenses, is a better distance than $2\frac{1}{2}$ inches, as, when the pictures are cut in half and transposed, in the former case they would fall at the right distance apart for correct vision, whilst in the latter case they would be too wide. In printing stereo. transparencies, the negatives should be cut in half, and transposed, before printing.

Nemo.—There is no difficulty in copying a positive on glass in the camera. Place the camera opposite the picture and focus on the screen. You will now observe, by a few trials, that the nearer the camera is placed to the object to be copied, the larger will be its image on the ground glass; but, at the same time, the longer will be the focus of the lens. You can thus obtain any sized copy you desire, by bringing the camera to the requisite degree of nearness to the picture, and correspondingly lengthening the body of the camera.

G. M. Ferri.—1. We do not see any particular faults to which we could draw especial attention in the prints you have inclosed. They are undoubtedly from very good negatives. 2. Either the collodio-albumen or Fothergill process. 3. If to a solution containing both nitric and sulphuric acids you add soda in *insufficient* quantity to neutralise both acids, the sulphuric acid, being the stronger of the two acids, will be the first to be neutralised. If excess of soda be added, both acids will of course be neutralised.

R. L.—The Leghill pictures are tolerably good, although they might be improved, by having less of the foreground shown, and being toned rather darker. Your name, however, shall be inserted. The other pictures are not good. We shall be very pleased to see your description of the camera If it is as useful as your account of the method of building a glass room, it will be a great boon to many of our readers.

Iodide.—If your iodide of potassium has a smell of garlic it is far too impure to use for photographic purposes. This peculiar smell is due to the presence of a sulphuretted compound arising from the process of manufacture, which has been proved, on trial, to diminish the sensitiveness of collodion. You had better purchase a pure article at a respectable dealer's, than attempt to purify the very impure salt you have in hand.

Amateur.—No camera at present exists, that we are aware of, capable of taking all that you require; and we hardly think it would be advisable to attempt to combine all the requisites in one, as it could not fail to be clumsy. Your best plan will be to have a single quarter-plate camera, and a twin lens stereo. one.

An Invalid.—We gave an opinion of the Photogen in our first volume, p. 206. We fancy it would answer your purpose better than the other light you mention, as, with the latter, great care is required, and no little chemical skill, to avoid accidents.

B. Vivian.—We do not quite understand your plan; but, whatever it is, we do not advise patenting it, as there would be a very faint chance of getting an adequate return for the money and trouble.

G. A. D., Douglas.—Will our correspondent favour us with a description of the apparatus by which the curious and interesting picture sent to us has been produced?

H. T. E.—If your pictures are taken in sunshine, the exposure will be much quicker. The reason why diffused light was recommended is that the shadows of objects taken in sunshine are generally too hard.

J. H. S.—We will forward our correspondent's letter to the author of the article referred to, and communicate the reply

A. B. S.—Consult the index. Full particulars have been given in our previous volumes.

J. D.—Many thanks for the process. 1. The cause of the redness on your print is owing to its not having remained long enough in the toning bath.

G. M.—1. The negatives seem good ones, but the positives are badly printed 2. Members of the Stereoscopic Exchange Club will not exchange with a non-member. 3. Not good enough.

E. B. T.—Received, with thanks.

Hy. Y.—1. Light blue. 2. Hardwich.

Communications declined with thanks.—F. R. Y.—N. W.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—Gallic.—P***r.

In Type:—E. B. Fennessy.—A. Watt.—J. Walter.—W.—H. N. Draper, F.C.S —B. M. Brackenridge.—M. A. Root.—R.—G. H. W.—G. M. Ferri.—W. J. D. H.—J. Drake.—A Subscriber.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

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WINTER PRINTING FROM PAPER NEGATIVES.

Granting that development-printing cannot yet regularly match the best sun-printing processes in its results, however a photographer here and there may have perceived its fascination, in the almost sleight-of-hand it confers on its neophytes, its extreme occasional beauty of results, and most valuable power of *play* upon the negative, so as to look forward eagerly to the publication, as time goes on, of better and better formulæ for practising it—it yet takes its stand safely upon the following grounds:—

I. *Positives can be taken by it, and well taken, all through the variations of winter gloom*, if we except, perhaps, those very few days, and parts of days, when storm-clouds and fog-banks, lowering to excess, cause readers and stitchers to resort to candles at strange hours.

The enthusiastic photographer, who loves to feel the weight of his camera when the sun shines, and who, when the sun does shine, cares not, with a quick-acting lens, whether it be January or July, will appreciate the possibility of getting through his printing at other times.

II. *It is cheaper.*—A *very* sensitive development formula will call for a silver bath of just half the cost of a sun-printing sensitiser of *medium* strength; and if the gallic acid, of which it is hard to get through an ounce, at 1s. 6d., and any difference in the salting-baths, diminish this proportion in favour of the sun-printer, the difference is still immense. All photographers for half the year, and the short-pursed half of the brotherhood for all the year round, will be its friends.

III. Practise development-printing in a stronger light, and you may use a twenty-grain or even a fifteen-grain sensitiser, with a correspondingly weak salter, get an agreeable-tinted proof, and save all toning baths, to a vast saving of silver and gold in other forms. It is quicker, *when skill has been obtained*, for those who have only a few printing-frames. My object is not to supersede any such development-printing formulæ of merit as may be found in the indices to the volumes of "The Photographic News," but to provide the *paper*-photographer, in these days a much-neglected child of the family, but who may very likely rise to eminence in the end, with simple directions for working any of them—rules especially adapted to the negatives he produces, and to publish for his use a very sensitive simple formula, up to which I have experimented, and which I have found satisfactory, which will largely diminish for him the lamentable times when actinism strikes work and he must follow.

In doing the latter, which will be best done *first*, I shall crave leave, for the sake of his younger brethren in general manipulation, to address him as a beginner. Photographic cultivation will show him at a glance where substitutions and variations may find place amongst my rules; whilst the beginner, if he be not a very ardent experimentalist, will be very much happier for seeing but one track.

SECTION 1.—PREPARATORY WORK PAPER.

Buy *English*—gelatine-sized, positive paper, say Turner's, a quire of the small size, at 2s. The paper most removed from porous woolliness will be the best; it should be hard, close-grained, not *too* thin, with an even, smooth surface.

Take a sheet of the paper and hold it to the light; if there is a maker's name or initials in water-marking, cut it off. Close scrutiny in strong light may be required to detect it. If there is a name or lettering, the readable side will guide you to the right side of the paper, so will the way it is rolled from the dealer's, the back of each sheet being outward. Lay one of your negatives on the right side of a sheet, and you will see into how many printing pieces of your size it will fold. You must have them a little larger than the negative, by say at least a quarter of an inch all round. More will be better, while an excess over what you can watch pleasantly in its changes would be wasteful, of course. With dry hands, well washed, and *rinsed from soap in clean water*—or doubly soaped and rinsed if you have been lately applying any strong chemical to remove silver stains—and a clean ivory paper-cutter, double and crease the sheet as you see needed, always keeping the right side inwards, and having the wrong side on a clean table-cloth, or portfolio. Touch the paper as little as possible, and only at the edges, holding it steadily, and indicating folds with the nail-tips of your left hand, while you crease and cut with the ivory knife in the right. Pencil-mark each piece that is cut to size in a corner of the right or smoothest side, and pile all on two sheets of any clean white paper that will cover them, one-half of one covering sheet being laid over one of the other as their base; fold the remaining outer halves over the pile—write on the outermost "*Turner*," "*Positive*," or whatever it may be; put the little case thus formed in a drawer or portfolio, and your printing-sheets will be clean when you draw on them to start with.

The Mucilage Solutions.—It perhaps requires a better paper for development-printing purposes than we have yet, to enable us to dispense, in cold weather necessitating long development, with some mucilage to help to keep the image from sinking. The strength of this should not amount to leaving a gloss, or we might choose albumen, in spite of its increased tendency to stains under the developer. But the world will tire of the perpetual aid of glaze; let development printing have merits of its own, and lend itself to a cry that must come, for more independent effects. I have found a useful aid to the sizeing in *Lichen Hibernica* (Irish moss, or "Carrageen;") but the beginner may well *practise* with this operation omitted. Take a small handful of this moss, which can be got at any chemist's, and is of trifling cost; put it into a deep dish or basin, and pour on a pint of cold water—place the dish near the fire (covered up from blacks) till the moss has swelled to its living size, then set it on the hob or top of the kitchen-stove for some hours more, till the moss appears set in a thick, scarce liquid mucilage; pour on another pint of cold water and leave the whole another few hours. Remove it when a thickish liquid, straining readily through a bag or gathered-up sizable piece of coarse muslin. Strain it thus—add another half-pint of cold water, and set again on the stove to mix the whole. Finally, line a funnel with muslin of a closer texture, and pour the liquid down into a bottle. It should now be of a nice fine smoothness, flowing easily and rapidly, but *noiselessly*; if it trickles, it is not sufficiently thick; if it clogs and drops instead of *running*, it is too thick by much. Keep a bit of camphor in the bottle with it, and pour it into a dish for use, immersing the papers in it, and avoiding *air-bubbles*, as described, under the salter, for a minute or two. The papers will be very heavy when drawn out with the tongs, and seem to have a thick shining surface of the moss

solution, but leave them hanging up all night, and you will find it in the morning well dried into their substance. They are now ready for

THE SALTING BATH.

Take bromide of potassium	7½ grains.
Chloride of sodium	7½ "
Distilled water, or filtered rain water, or melted snow	1 ounce.

If the water is very cold, and you wish to use the salting bath shortly, pound the bromide of potassium in a glass mortar to quicken dissolution. Six ounces is a convenient quantity of the bath to make at once for quarter-size pictures. When the salts are dissolved, filter the bath into a dish, and immerse three papers at a time in it, freeing each from air-bubbles with the tip of tongs kept on purpose for salting or iodising generally, or with the end of a glass rod. Keep them in till the top one has had a full minute, draw out all, and hang to dry. Salting is best done not later than three or four o'clock on a winter day—you will then be able to sensitise in the evening, and hang the paper to dry all night.

(*To be continued.*)

GREY SOLARISATION AND TRANSMITTED POSITIVES.

BY J. F. HARDWICH, ESQ.

Some few months since, I addressed a note to you on the subject of red solarisation of collodion negatives, having found that the great intensity of the light at that season of the year was a source of difficulty to inexperienced operators. With your permission, I will now say a few words on a defect of an opposite kind, which is often complained of in the winter season, viz., *grey solarisation*, accompanied, in many instances, by the appearance known as "halation" of negatives; that is to say, a halo around certain parts of the image, or a blurring and prolongation downwards.

Nearly twelve months since I received a letter on the subject, which I took some pains to answer, and finding that the operator had to contend against a deficiency of light, and a low temperature, I advised him to strengthen his solution of pyrogallic acid, and to be especially careful in draining the plate before putting it into the slide. These hints, however, did not prove sufficient, and it afterwards appeared that the nitrate bath was *alkaline;* either from a fault in the water or the nitrate of silver. Many of your readers have, no doubt, traced this defect of weakness of image and indistinctness of outline to faults in the bath, and, perhaps, in some cases, to the presence of an excess of nitric acid. They may not, however, have noticed that an *alkaline condition* of bath will often disturb the action of the developer in a similar way, and be a means of producing what is known as a transmitted positive, instead of a negative. I have in my possession at the present time a bath, which I find to yield this perversion in an unusually complete manner, working at 45° Fahrenheit, and in a November fog. It was neutralised with carbonate of soda in the first instance, but no acetic acid was added. Whether it will yield transmitted positives as the light becomes brighter, and the temperature rises, I cannot say; neither am I able to affirm positively that the sample of nitrate of silver was photographically pure, although I have seen good pictures taken by a bath made from the same crystals.

These remarks are short and unconnected, but they will suffice to direct attention to the state of the negative nitrate bath, which is of more consequence at this season of the year than in the summer. Traces of oxidised organic matter in nitrate of silver, such as are sometimes found in the product of the first crystallisation, will upset the action of the bath, and especially so in the absence of all acid, or in presence of excess of nitric acid.

METHOD OF OBTAINING PHOTOGRAPHS IN PRINTING OR LITHOGRAPHIC INK.

Unsized paper possesses the faculty of absorbing water readily, but when the pores of such paper are filled with bichromate of potash, which has been acted upon by light, it resists the admission of moisture, and, after being heated, readily receives and retains printing-ink on its surface. This paper, after having the photographic image imprinted upon it by means of the bichromate of potash, being strongly heated and moistened, is capable of being inked in the same way as a lithographic stone, in this sense, that the portions of it which have not been acted upon by the light, imbibing the moisture, become incapable of retaining the ink on the roller being passed over it, while the parts on which the light has acted retain the ink, which may be accumulated on the surface until the design has attained the desired vigour. By substituting lithographic ink for printing ink, a negative is formed on paper, which may be transferred to stone or metal by means of a copying press, and from this surface copies may be printed which would, of course, be a fac-simile of the original.

The consideration of this circumstance, which forms the principle on which most of the lithographic copying presses are constructed, has led M. Asser to the invention of a particular process which is, in substance, contained in the following description.

Take a sheet of unsized paper of a medium substance and made of fine pulp, cut it to the required size, and, having marked one of the corners, take a clean sponge and wash the marked side with a solution of starch, and then hang it up to dry. When dry, float it, starched side uppermost, on a highly-concentrated solution of bichromate of potash in distilled water. The paper becomes saturated almost instantaneously, and is then removed from the bath and hung up to dry in the dark room. When dry, it may be exposed in the printing frame under a clear sharp negative, until the print has acquired a reddish-brown tint, while the parts not acted upon by the light will be found to retain the original orange colour. When sufficiently printed, remove it from the frame and float it, print upwards, on distilled water, taking care not to allow any air bubbles to intervene between the paper and the water. The print must remain in the water until all the bichromate of potash has been dissolved out and nothing remains but the picture. Dry the print on a piece of marble or stone, heated to a high temperature, and afterwards rub out the wrinkles with a flat iron, or by passing it through rollers. The print may be left to dry spontaneously, and afterwards heated, if more convenient. Next, take a sheet of unsized paper and cut it a little smaller than the print, moisten it, and spread it smoothly on a piece of glass, removing the excess of water with blotting-paper. Float the paper bearing the image, face upwards, in distilled water, until the moisture has thoroughly penetrated through the paper and moistened the starch, then lay it in the same manner on the paper on the glass, and over it spread a sheet of sized paper. Take a cloth and well rub this paper, in order to press out the excess of water, and to cause the moisture to thoroughly penetrate the whites of the picture, remove the top sheet, and the print is ready for the next operation, which must be performed without delay.

Have ready some printer's ink, to which a very little oil varnish has been added (the slightest excess will cause a failure), and work this about with the roller, which must be covered with very fine cloth stretched over flannel to lessen the pressure, and, when the roller is evenly covered with the ink, pass it very lightly over the print, until the image appears in black, precisely as if it rested on a lithographic stone. When the image has acquired sufficient vigour, it is floated in distilled water acidulated with a few drops of nitric acid, the object of which is to remove all the bichromate of potash and leave nothing but the ink. If, instead of printing ink, lithographic ink be used, it may be trans-

ferred to a lithographic stone by placing it while still moist on the surface, and screwing it down in a copying press. If it should happen that the paper adheres rather strongly to the stone, it may be readily removed after moistening with a little water.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

Another very effective way of forming a background is to strain a piece of wide holland, or thin linen sheeting, the required dimensions, on a wall or frame, then give it a coat of thin sizeing, and, when dry, mark out the panelling with paper-hanging pattern moulding, of any dark colour, avoiding blue; among paper-hanging decorations we often meet with a large vase and flowers, cut one out from the paper on which it is printed, and paste on one side of the

background; on the other carry up some paper cuttings and moulding, to form the decoration, as given in the sketch. This can be varied in many ways, to suit the taste of the operator, varying the centre, as before, from dark to light, by pasting the pattern in one case on black holland, in the other on brown. If we wish to introduce drapery on either side, take some coarse brown canvas wrappering, such as drapers pack their goods in, and hang it in drapery form, when we shall have a pleasing and effective background, without any painting, at little trouble and small cost.

THE ACTION OF LIGHT ON DIFFERENT AQUEOUS SOLUTIONS.

BY M. NIEPCE DE ST. VICTOR.

This series of experiments is in continuation of the paper I published on the same subject; that is to say, that having formerly insolated the dessiccated substances, I have now insolated them in solution.

I will say at once, that Mr. Draper has already established that peroxalate of iron being exposed to the light in solution, liberates a gas, and acquires the property of precipitating salts of gold in the metallic state; and that the celebrated professor of New York has made an application of this discovery to photometry by weighing the quantity of gold reduced.

For my part, here are my experiments. It is known that after gallic acid, oxalic acid is the substance which most perfectly reduces the salts of gold; but if a solution of this latter acid be insolated, it reduces the chloride of gold much more promptly. The same holds good of all organic acids which may then, in different degrees, reduce the salts of gold, and even those of silver, not acted upon by the light.

I afterwards insolated a solution of nitrate of uranium in distilled water, and, separately, a solution of neutral organic matter. If the first solution be not neutralised by ammonia, or yellow oxide of uranium, it will not reduce (at least, not in the same period of insolation) the chloride of gold, while it will do so in the contrary case.

As to the second solution, it yielded me no trace of reduction; which arises, perhaps, from my not having insolated the substance for a sufficient length of time; because it is certain that starch and gum may be in part converted into glucose by the sole influence of light, as M. Corvisart and I have demonstrated.

Now, if we insolate a mixture of nitrate of uranium and neutral organic matter, in solution, in a vase filled and closed hermetically, this liquor reduces chloride of gold and nitrate of silver after a very short period of insolation. The reduction becomes stronger and stronger in proportion as the exposure to the light is lengthened; a moment, however, arrives when it reaches its maximum of effect, which is shown by a black colouring which the liquor acquires directly a little nitrate of silver is poured into it.

If the insolation be afterwards prolonged, the liquor becomes grey on the addition of nitrate of silver; it loses more and more of its reducing power, which ends by completely disappearing, so far as nitrate of silver is concerned.

But, singular fact, if we withdraw the liquor from the action of the light when it has attained its maximum of activity for reducing the salts of silver, this liquor loses its activity in less than five minutes, if agitated in free air, by boiling, or by being left to itself for a long time in free air; if, on the contrary, it is kept hermetically closed, it retains it.

A liquor which has acquired only a part of its activity, under the influence of the light, and which has lost it under the circumstances just described, may be insolated anew, and produce the same effects detailed above, as might be imagined.

If the neutral organic matter in the solution of uranium be replaced by an organic acid, this insolated liquor reduces the chloride of gold very well; but, to enable it to reduce nitrate of silver, it is requisite that it should be neutralised by ammonia.

Now, this is what is observed in regard to the solution of nitrate of uranium and organic matter: the liquor, under the influence of the light, begins by acquiring a green colour, if the solution is acid, and violet, if it is neutral.

If the liquor be left to the action of the light, a slight effervescence is produced, the liquor becomes opaline, the effervescence increases; ultimately a precipitate is formed in the bottom of the vessel if the organic matter is in small quantity; in the contrary case, the liquor coagulates. In this condition, it no longer reduces nitrate of silver, but it is still capable of reducing, very promptly, the chloride of gold.

If we shake the liquor in which the precipitate is formed, this precipitate is completely dissolved in less than five minutes; the same also takes place after it has been left to stand for a long time.

That a precipitate may form in an insolated liquor, it is necessary that it should not be too acid; the less acid it is, the more rapidly it forms. This precipitate dissolves very readily in acidulated water. It remains to examine the nature of this precipitate.

I shall speak now of the action of light on wines and brandies.

If we insolate wine in a white glass, quite full, and hermetically closed, it will be found, beyond dispute, that, after two or three days, the wine will be more sweetened than that which was exposed at the same temperature but deprived of light.

The action of the light may be favourable on certain wines; it may give them the qualities of an old wine, on the condition that the action of the light shall be sufficient, but not too prolonged; otherwise, the wine often contracts a disagreeable after-taste, and, in all cases, it becomes a wine *passé*.

The Amateur Mechanic.

GLASS—(*continued*).

Trimming the edges of the glass after it has been cut to the polygonal form we described in our last, may be effected in two ways. Perhaps the most efficient and expeditious is by means of an instrument used by opticians for the purpose of cutting spectacle glasses to any required size, and called technically, we believe, "the shanks." The instrument is made of soft iron, and is in shape somewhat like a large pair of scissors; but instead of the blades crossing each other, and working on a centre like scissors, the joint, or centre, on which they work, is at the extreme end, opposite the handles. The form is something like the following:—

The figure shows the "shanks" a little open; when closed, the inner edges—which are square, not sharp, about one-twelfth of an inch thick—meet. The joint is sufficiently loose to admit of a little lateral play of the blades, the mode of using which is slightly different to that of scissors. The "shanks" are held in the right hand, the same as a pair of scissors, and a small portion of the glass to be trimmed placed between the blades; and, in closing them, in addition to the perpendicular movement of scissors, a lateral movement of the upper blade, of which, as we have said, the joint admits, is also brought into play, the blade as it closes on the glass moving at the same time from left to right; thus producing a scraping action on the edge of the glass, by which small particles are rapidly cut away. It is best, especially for beginners, to take very little at a time between the blades, as there is then less danger of cracking the glass. A little practice on waste pieces of glass will be necessary to acquire skill in the use of the shanks; but in skilled hands, glass may be rapidly cut to any size or shape by the use of the "shanks" only.

Where the necessity for the use of such an instrument as we have described occurs but seldom, it will scarcely be worth while to have one made, as the samo end may be effected, perhaps not quite so expeditiously, by means of an instrument most photographers, or at least all "amateur mechanics," will have in their possession—we mean a pair of iron pliers. These should have the surfaces which are to come into contact with the glass softened in the fire, as a steel surface is much more apt, by its hardness, to notch the edge of the glass, and make it fly, than soft iron. We use for the purpose a pair of pliers which, having often come in contact with the flame of a large spirit lamp, whilst holding the daguerreotype plate during the process of gilding, have lost anything like extreme hardness, and we find they answer tho purpose admirably. The larger corners of the angular glass may be gently nipped off with the pliers, which may then be used with a similarly scraping motion to that we have described as effected with the "shanks;" the motion being, in this case, however, produced by a turn of the wrist, the firm joint of the pliers not permitting a lateral movement by any other method. A little care and practice will soon give skill in trimming glass by this method, without risk of breakage. It is scarcely necessary to say that a glass portrait being trimmed by this method should be held carefully by the edges to avoid contact with the surface. We may also remark here, that as with the greatest skill and care it will be impossible to trim the edges of portraits so smooth as not to show the jagged edges of the glass, and as the edges cannot well bo ground without risk to the portrait, it is always desirable that the locket, &c., should possess a small matt or rim inside the glass, to hide the jagged edges. This also gives a little more license in using the diamond, to cut slightly within the marked shape.

Whilst speaking of the cutting of glass with the diamond, a few words on fitting glass into frames for pictures may not be inappropriate, as the operation will more or less frequently fall into the hands of most photographers. In the first place, we will suggest a little expedient whereby injury to the delicate moulding and open work of projecting corners will be prevented. It is not an uncommon thing to see the gilding abraded, or the most delicate mouldings—which often are the most projecting parts—broken by laying the frame on its face on a table whilst the glass and picture are fitted in. This is to be avoided by providing a couple of bars of wood, say an inch and a half, or two inches thick, the same deep, and a couple of feet long. These are to be covered with cloth, baize, or velvet, and when placed on a table, parallel to each other, at a sufficient distance apart to form a bearing, the face of the frame is rested on these, taking care that the points of contact are free from delicate or fragile mouldings. These, of course, will serve for any sized frame within their length, and will effectually preserve both gilding and pattern from injury.

The glass being carefully cleaned, is placed on the rabbet of the frame, and is then to be made air and dust tight by means of strips of paper. Glueing will be the most efficient means of fastening these, and care must be taken, not only that the strips do not project beyond the rabbet, but that they be kept some little distance withiu, so that even when viewed sideways they may not be seen in front. For the same reason, brown paper is better than white, being less likely to catch the eye. When the glue is dry, the picture may be laid on the glass, from which dust must first be removed. Tho backboard is then fastened on with brads, and the back of the frame being glued, a sheet of brown paper covering the whole, by this means attached. The picture is then well preserved from air and dust. In hanging pictures, especially glass positives or daguerreotypes, it should be remembered that they are much better seen if tho frames project a little, or hang forward at the top. To give them this position, the rings by which they are suspended should be inserted about one-third the distance down the side of the frame at the back.

(*To be continued.*)

Photographic Chemistry.

NITROGEN. *Equivalent* = 14.*

The atmosphere which envelopes the earth is formed of four parts of nitrogen to one part of oxygen. If we withdraw the oxygen from a quantity of atmospheric air confined in a close vessel, we find that there remains a gas which is incapable of sustaining life; and a light immersed in it is immediately extinguished. To obtain this gas in a pure state is not difficult, and thero are various methods of accomplishing this; among the easiest of which may be mentioned that of burning out the oxygen by means of phosphorus. Put a piece of phosphorus in a porcelain capsule, and float it on a large cork in the pneumatic trough; ignite it, and invert over it a bell-glass, the edges of which rest on the ledge below the surface of the water. The phosphorus will continue to burn so long as any oxygen remains in the vessel, the combination producing phosphoric acid, which is dissolved in the water. When the gas

* The name of nitrogen was given to this gas from its combination with oxygen producing *nitric acid*, which, by combining with potash, produces the well known substance *nitre*, or, as it is commonly called, saltpetre. This gas was formerly called *azote*, or life-destroyer, and this name is generally retained by French chemists, who also use the terms azotic acid and azotate of potash, silver, &c., which we term nitric acid, nitrate of potash, nitrate of silver, &c.

has cooled it will be seen that the water has risen in the vessel, and that the volume of air it contained is reduced by about one-fifth; the gas which remains is nitrogen.

The gas obtained in this manner is not absolutely pure; it is in a slight degree contaminated by the vapour of phosphorus and the carbonic acid gas which exists in the atmosphere. Another method of obtaining it is by heating thin copper trimmings, in a porcelain tube, to redness, and then passing a current of atmospheric air through; the copper deprives the air of its oxygen in its passage, and the nitrogen may be collected in the ordinary way over the pneumatic trough.

Another very common method of obtaining nitrogen is by decomposing ammonia by means of chlorine gas. Ammonia is a compound of hydrogen and nitrogen, the chlorine combines with the hydrogen and forms hydrochloric acid, which in its turn combines with the undecomposed ammonia and produces hydrochlorate of ammonia, which is dissolved in the water in which the ammonia is held in solution, and nitrogen is liberated. This experiment must not be continued until all the ammonia in the solution is dissolved, or the chlorine will then attack the hydrochlorate of ammonia, and give rise to the formation of a highly-explosive compound known as *chloride of nitrogen*.

Nitrogen has neither colour, taste, nor smell; its density is rather less than that of the air, and it is very slightly soluble in water. Its properties are rather of a negative character, since, though destructive to animal life, it has no injurious effect on the organs, as is seen by the fact that four-fifths of the atmosphere we breathe is formed of it.

The atmosphere is essentially a mixture of oxygen and nitrogen, every 100 parts containing 20 parts of the former to 80 parts of the latter; and though carbonic acid, and traces of other gases, may be discovered in it, it is only in such infinitesimal quantities that it is scarcely worth taking into consideration. Excepting this admixture of gases arising from the decomposition of animal and vegetable matter, the atmosphere is the same everywhere, and at any elevation. That which was obtained by means of a balloon from a height of over 20,000 feet was identical in its composition with that taken from the deck of a ship. As to the cause of this uniformity, different opinions have prevailed; some maintained that it must be owing to a chemical combination of the gases; but the best authorities are decided in their opinion that this view is erroneous; indeed, we think the following facts must satisfy anybody that it is:—

When two gases combine chemically, there is invariably a great evolution of heat; now, if we take oxygen and nitrogen in the proportions to form atmospheric air and mix them together, there is no heat generated, and the mixture is identical with that of the atmosphere. Again, water which is left for a length of time in contact with the air, dissolves the gases of which it is composed. Now, supposing the atmosphere to be formed of oxygen and nitrogen in a state of chemical combination, it is clear that the gases recovered from water so exposed would be in the proportions we have mentioned as constituting the atmosphere, viz., one part of oxygen to four of nitrogen; but this is not the case, nitrogen being less soluble in water than oxygen, it will be found that these proportions are notably altered, and that a considerably smaller proportion of nitrogen than of oxygen is dissolved.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 29th November, 1859.

M. Niepce de St. Victor has just communicated to the Paris Academy of Sciences a new paper on the property possessed by light of rendering certain solutions capable of reducing salts of gold and silver. After having experimented upon solid substances, M. Nièpce turns his attention to substances in solution.

Professor Draper has already made known that peroxalate of iron exposed to the sun evolves a gas, and acquires the property of reducing salts of gold and precipitating the metal. According to M. Nièpce, after gallic acid, oxalic acid is the substance which reduces, most easily, gold salts; and if this oxalic acid be previously submitted to insolation, it acquires a more powerful reductive energy. Many, if not all, organic acids, after insolation, reduce gold salts and even some silver salts.

Insolated nitrate of uranium only reduces salts of gold when the former is rendered perfectly neutral by ammonia, or by oxide of uranium. An insolated mixture of nitrate of uranium and organic matter reduces both salts of gold and nitrate of silver. These reductions are the more active the longer the solution has been exposed to the light; a moment arrives, however, when this action appears to have attained a maximum, and further insolation of the reducing mixture terminates by an extinction of the property altogether.

The reducing liquid exposed to the air, boiled, or shaken after it has attained its maximum of effect, loses its reductive action. Not so, however, if it be kept in an hermetically-sealed flask. A new insolation brings back the reductive action of mixtures that had lost it by the above causes.

The paper terminates with some remarks on the action of light upon wines and spirits. Wines, when insolated in full white bottles, which are well corked, gain, in the space of two or three days, a certain amount of sugar. A proper degree of insolation ripens the wine and improves its quality; but, if it be too long submitted to the action of light, wine acquires a disagreeable taste. Such are the principal facts contained in this new paper.

At the last meeting of the *Société Française de Photographie*, M. le Duc de Luynes produced some proofs and the description of a new process, in which no salts of silver are used. But the process involves the use of still more expensive salts—namely, those of gold and platinum. We must acknowledge, however, that M. De Luynes has had in view simply the production of permanent, unalterable proofs. The salts of gold or platinum are employed mixed with compounds such as chloride of iron, or nitrate of uranium, upon which light has a reductive action.

1. Equal volumes of nitrate of uranium and perchloride of gold are poured over a positive paper, which is then dried before the fire. This sheet is placed behind a negative image, exposed, and watched until the image makes its appearance. The proof is then taken away, and washed many times with water, to dissolve out the soluble salts. The positive which remains offers various tints, according to the paper employed, and contains both gold and uranium.

2. The same operation is repeated with perchloride of iron, substituted for the nitrate of uranium. The positive obtained is washed with weak hydrochloric acid, to dissolve out all the iron, and afterwards with water. These positives contain gold only. In the first process, washing with hydrochloric acid would dissolve out the salt of uranium, which contributes with the gold to form the image.

3. A mixture of perchloride of iron and bichloride of platinum are placed upon the positive paper. The latter, being placed under a negative, is exposed to the sun. Even after two or three hours of exposure the positive is seen white upon a yellow ground; a reduction has taken place, and, to render it sensible, the paper is passed through a solution of chloride of gold. The image then immediately makes its appearance in black, and is formed of gold and platinum.

After this communication, Mr. Bingham remarked that the use of perchloride of iron and chloride of gold had been long since proposed by Sir John Herschel, who had based upon their action his *chrysotype* process, which was abandoned solely on account of the expense of the gold salt.

At the last meeting of the *Academy of Sciences*, at Paris, MM. Gide and Barral presented the 16th volume of the *Œuvres complètes de François Arago*. This immense publication was commenced in 1854, and the scientific world owe thanks to M. Barral for the speed and care with which he has put in order these sixteen volumes. A few words of praise are also owing to M. Gide, for the vigour with which he has published this admirable collection. Arago's memoirs, like

those of most scientific men who labour constantly, are dispersed through many varied publications. He never published what might be termed a book, and yet his works alone amount to sixteen enormous volumes in octavo, and constitute one of the most valuable collections of papers existing at the present day! The volume here noticed contains many valuable papers on astronomy, optics, terrestial magnetism, atmospheric electricity, &c., and, among others, a long memoir by MM. Biot and Arago, on the dispersive power of different gases.

M. Chacornac, one of the astronomers of the *Observatoire Impériale*, has sent to the Paris Academy a note concerning the relative intensity of the light emanating from the centre and from the borders of the sun. A great number of observations has proved, in a satisfactory manner, that the solar light diminishes in intensity from the centre towards the borders of the sun; so that, at the borders, this light is barely four-tenths of what it is at the centre.

In an experiment made last week, and which consisted in making the light, emanating from the penumbra of a large solar spot situated near the centre of the sun, coincide with the light which emanates from the borders of the solar disc, M. Chacornac was enabled to ascertain that these two lights were sensibly equal in intensity, notwithstanding that the penumbra of the spot stood out remarkably by its darkness, upon the vivid light of the centre.

M. Schaffuer, of Louisville, proposes that a line of telegraph between Europe and America should be disposed as follows:—The line would run along the oriental coast of Labrador, to the 55° of latitude, whence it should attain Greenland, through part of which the line could be subterraneous; from Greenland it should pass to Iceland, thence to the Feroe Isles, and from them to Glasgow, in Scotland. The greatest section would be between Greenland and Labrador, about 170 leagues. Between Greenland and Iceland the distance is rather more than 80 leagues, from Iceland to the Feroe Isles 72 leagues, from these to Glasgow 50 leagues. So that this newly-proposed route is 80 leagues shorter than the transatlantic one.

Professor Bœttger has made known, in the *Journal fur Praktische Chemie*, some very remarkable phenomena that take place when essence of cloves is put in contact with certain metallic oxides. When dry oxide of silver is damped with essence of cloves, the essence takes fire spontaneously; the same curious combustion also happens when the essence is added to peroxide of silver obtained by electricity, or to oxide of gold. With peroxide of lead, the essence in question does not take fire, but becomes heated, and evolves smoke; the same is observed with chloride of lime.

Essence of cloves has, however, no such action upon permanganate of potash nor upon oxide of mercury. Moreover, the hydro-carbon oils contained in this essence, when separated from the eugenic acid it also contains, are not capable, according to M. Bœttger, of producing the curious effects alluded to above.

M. C. Jessen has published, in *Poggendorff's Annalen*, a note on the solubility of starch in water. Contrary to what is stated in most chemical works. and, as M. Guérin Varry has already shown, starch is soluble even in cold water, if care be taken to pulverise it thoroughly in a mortar, so as to destroy the membrane which envelops the grains. This fact is placed beyond a doubt by an experiment of M. Jessen: By pounding down a mixture of starch and sand in water. and filtering, a clear liquid is obtained, which deposits nothing, even after a space of some days. But this liquid contains starch in a soluble state, for iodine produces with it the characteristic blue tint, and alcohol precipitates the starch itself. When the clear liquid, obtained by filtration, is viewed under a powerful microscope, not a particle of starch can be distinguished. These facts show clearly that starch is capable of existing in a soluble state, and will, doubtless, throw some light upon certain problems of vegetable physiology, concerning the origin of starch in plants. The solution of starch, obtained by M. Jessen, soon undergoes a transformation; in a few days all the starch is converted into a new substance, to which iodine imparts an orange tint, as in the experiments of M. Nièpce, concerning the action of light upon starch. This new substance is, in all probability, dextrine. The transformation in question is not instantaneous, but gradual, the iodine giving to the solution first a violet tint, and then an orange-yellow colour. This reminds me that M. Béchamp described in 1856, in the *Annales de Chemie et de Physique*, a soluble variety of starch obtained by heating to 100° (centigrade) this substance with acetic acid. The soluble starch thus obtained becomes blue with iodine. And this reminds me of another fact which it is useful to know: acetic acid alone cannot convert starch into dextrine or glucose; in other terms, by boiling starch and vinegar, the former will not lose its property of becoming blue with iodine; but if the vinegar in question has been sophisticated, if it has been mixed with another acid, with sulphuric acid, for instance (as it has often been practised), then the starch will, in the above experiment, be wholly converted into dextrine and glucose, and the sophistication detected.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

Dsetjuma's opinion is, that Russia will eventually absorb the greatest portion of the foreign trade; for this reason, that, in consequence of the vicinity of her possessions on the Amoor river, she will be able to send grain to Japan at a far lower rate than any other nation; and as his country produced everything else they required in sufficient abundance, rice and grain would be almost the only articles they would purchase in any quantity. I asked him if the Russians could grow rice very largely in this territory on the Amoor, but he could give me no information on this point. From the fondness of the Japanese for rice, I argued that any nation which could send that commodity at the cheapest rate would always meet with a better market than one which could send only wheat, and that, therefore, England would get the greatest part of the foreign commerce of Japan, from the facilities she possesses for exporting rice from her Indian possessions in almost unlimited quantities. Dsetjuma was not sufficiently informed on the subject of the commerce of foreign nations to discuss the matter any farther, so he merely remarked that time would show that there was no scarcity in the country at present, and that, except in the case of a failure of the crops, the supply they received already was amply sufficient for their wants, combined with what the country itself was able to produce.

On another occasion, when we returned to this subject, I asked him if he did not think that if railways were made in Japan, so that rice might be conveyed from the port to the interior at a low rate, it would not supersede the present system, and induce a different method of cultivating the land. He, however, thought it would not. The inhabitants of towns would no doubt purchase this rice while they could get it at a lower price than that grown at home. But this could not well happen, because the large landholders, most of whom derived the principal part of their income from its sale, would resist its introduction as long as possible, and, if eventually forced to yield, would sell at a lower price. The system on which land is cultivated in Japan is, he tells me, similar to that which prevails in Russia. The damia, or prince, as we translate the word, is the owner of a large extent of land, in some cases an entire district; this land is cultivated by the people, who, having certain portions of the land allotted to them, pay either a proportion of its produce in kind to the landlord, and give him a certain amount of labour in addition, or they give him a greater amount of labour on the lands he reserves for himself, and keep all that their own allotment produces. This system is modified in certain cases, as, for

* Continued from vol. iii. p. 140

instance, where the landowner has a mine on his estate. Then he employs men wholly in digging and smelting the ore, paying them by a certain quantity of rice, if it is grown on his estate, or otherwise, in some other form, but usually in produce of some kind; hence he concluded that in no case could the present system of cultivation be superseded, and that the only result of an increased exportation of native products would be to increase the riches of a comparatively small number of individuals.

I have been precluded, by the reason I have stated, from seeking information from any other native than Dsetjuma; but, from his position, I have no doubt that what he has told me is correct, and it enables me to see pretty clearly where the obstacle lies to a more extended foreign commerce. These damias have an immense interest in retaining the monopoly which they possess of supplying the market with almost every necessary commodity, consequently they use all their influence to prevent a free introduction of similar commodities from abroad; and the influence which their riches, and the authority they have over the people on their estates, give them with the Court, is such, that I doubt whether anything can overcome it.

At Stchoun I saw an incident of Japanese life which struck me as being one of the most extraordinary character, and which I should not have believed had it been told me in Europe. We had taken up our quarters at an inn in that place, intending to remain until the following morning, although it was still early in the day. Our apartment, as was generally the case, was at the back of the house, a few feet above the garden. We had dined, and were discussing some questions of Japanese social economy which I did not clearly comprehend, when our attention was attracted by a kind of procession, which was making its way towards an arbour nearly facing us. There was a considerable crowd following, which soon filled the garden, and prevented me from getting nearer, but, from my elevated position I was able to see very clearly all that happened. The foremost of those who walked in the procession was a rather short and stout man, his face having a coarse, sensual expression, which was sufficiently perceptible, notwithstanding the fixedness of his features and the air of determination with which he strode along. On reaching the arbour, those about him stopped, and he entered it alone, and sat down on a low table. I watched his proceedings very attentively, for there was such a serious expression on the countenances of the spectators, so different to what I had been accustomed to see in Japan, that, without knowing what was about to take place, I anticipated something painful.

As soon as he appeared comfortably seated, one of those who accompanied him handed him a pipe, and he took several strong inspirations, drawing the smoke into his lungs and blowing it out through his nostrils; he then handed the pipe back, and drew a knife from some place, and deliberately raising his robes, he, in the presence of the crowd of spectators, made two incisions in his abdomen in the form of an X! The sight made me feel so sick and giddy that I was obliged to throw myself on the floor for a minute or two; and when I had recovered myself sufficiently to look at him again, he was sitting quietly in the same place, his back resting against the inclosure, and nothing in his appearance to denote what had occurred. A great part of the crowd had dispersed, as if their interest in the matter ceased with the performance of the operation. Just then Dsetjuma came up and beckoned to me to come down into the garden, where he had been to make inquiries, and I walked with him to the arbour in which the horrible affair had taken place. We found the wretched man sitting in the attitude I have just mentioned, and quietly and calmly smoking a pipe, as if he was not sensible of pain. I looked at him attentively, but he evinced no consciousness of our presence, and it was very evident that he was near his end, or was under the influence of some powerful narcotic. There was not the slightest movement of any kind; the eyes were fixed, but when I looked more closely into them, they seemed filled with such a deep, strange, unfathomable expression, that I shuddered and drew back; and not all the endeavours of Dsetjuma to induce me to take a photograph of him were of any avail, although my refusal did not prevent him from making the attempt, which proved to be unsuccessful, from the depth of shadow in which the object was involved.

The occurrence I have just described was so new, and appeared so extraordinary to me, that I endeavoured by every possible means to find out the cause. Dsetjuma was quite as anxious as I to obtain the information, but so many contradictory answers were given to his questions, that it was quite clear those whom he addressed knew nothing about it. His inquiries of the landlord, however, were more successful in getting at the truth, or, at all events, somewhere near it. It appeared the suicide held the post of manager, or what I think would be more correctly expressed as steward, of a mine on one of the crown lands. His duty in this capacity was to take charge of the product of the mine, and after deducting the amount expended in working it, to hand over the remainder to the damia, or chief ruler of the province, to be by him transmitted to the emperor. It happened that this steward, for some reason or other, ordered a flogging to be administered to one of the miners, who shortly after ran away, and gave information to the damia that the manager kept a portion of the gold back, and that he had it concealed in his house. Upon hearing this the damia caused the miner to be imprisoned, and sent orders to the steward to come to him, and to bring his accounts with him. He was on his way to render the account required, when, either from conscious guilt and fear of the consequences, or—as one of his friends said, who remained with him till his death—conscious of his innocence, he had determined to die, and to cast his blood on the head of his accuser, and so bring down upon him the vengeance of the gods.

This method of avenging an injury struck me as being so absurd, that I inclined to the opinion that he was afraid to undergo the ordeal of having his accounts examined, and this also was Dsetjuma's opinion; but, to my extreme surprise, he assured me that such occurrences, though now comparatively rare, were once not uncommon, and attributed their diminution to the disbelief in the gods, which had been growing for many years. I asked him if he remembered a similar occurrence, where the cause of the suicide had been that assigned on the present occasion. He told me he could remember more than one case, where no other reason could be imagined; but that, in the majority of cases, the suicides arose from weariness of life, or to avoid punishment for an offence against the laws.

(*To be continued.*)

NOTES ON A TOUR TO THE WYE.

To the Editor of the "Photographic News."

Sir,—Your correspondent, "J. N.," who has in a recent number favoured us with an account of his tour to the Wye, intimates his intention of working by the wet process when next he visits that locality, and expresses the opinion that dry plates do not render trees and foliage so so well as wet collodion. In this I must beg to differ from him, as some of the most beautiful photographs of forest scenery I have seen, have been taken by the oxymel and Fothergill processes. I am a wet collodionist myself, and have this year gone over the same ground as "J. N." and "R. A. W.," with a tent, and I may be accredited, therefore, when I assert that the wet process is not always to be relied on, and in many instances will not work at all, when dry plates can be used with the greatest success. The fact is, that no photographic process can be relied on with certainty, otherwise how invaluable would dry plates be. If we could infallibly calculate on their producing satisfactory results, what tourist would work the wet process? We see every day that with wet collodion the most expert operators cannot produce certain results, with all their appliances

about them, and with a glass house artistically arranged to regulate and conduct the light. Why, then, should we expect to arrive at perfect results out of doors, in states of light constantly changing, the actinism affected by atmospheric influences, and the objects to be taken liable to be altered by every gust of wind, or darkened by every cloud? It seems to me we expect too much. The chemicals employed for the wet process are constantly liable to deterioration from travelling, and to injury from accident. In the hot weather of last July, it often happened that no sooner had I coated a plate, than the collodion dried up in large patches on the surface, so rapid was the evaporation of the ether. On some days I found it was of no use to attempt to work, every plate proving a failure; the next day, without any apparent reason, with the same bath and chemicals, I produced charming negatives. Let not the idea be entertained, then, that the wet process is infallible. I believe it to be just as capricious as dry collodion, with this sole but signal advantage, that you see your failure at once; while with the other you don't find out your mishap until the time of development, which, as "J. N." truly observes, may not take place until you are hundreds of miles distant from the spot where the plate was exposed.

I have now said all I intended; but having written thus much, I may, perhaps, be excused for adding a few memoranda which may be useful for future tourists with a camera on the Wye. It is generally admitted to be preferable to commence at Ross, and go down the river, especially if it is desired to go by water, the stream being easily descended, while there is some difficulty, and more time required, in ascending. Indeed, I have frequently seen boats sent back from Monmouth to Ross in a cart. The turnpike road from Ross to Monmouth is more direct, but by adopting it one loses nearly all the pleasure of the river scenery. At Ross itself, a small, dirty, dull town, there is nothing worth photographing, not even the boasted view called "*The* Prospect," *κατ' ἐξοχην*. The neighbourhood is said to afford several pleasant walks, from which extensive views may be enjoyed. Those to Penyard Castle, Brampton Abbots, Springfield, Leys Hill, the Vale of Walford, and Ruardean, are among the number; while Goodrich Court and Castle, Coppet Hill, and Pencraig, on the right bank of the Wye, will be visited as a matter of course. Excursions, both up and down the river, may also be made; and Mr. Evans, the postmaster at Ross, is the best party to apply to for boat accommodation. Any of the hotels at Ross may be fixed on as head-quarters for a few days, or longer. At Goodrich is a "hostelrie" where the wearied amateur may pass a night; and at Whitchurch is an inn with comfortable accommodation. The tourist who wishes to avail himself of the bye-roads running beside the river, either with or without the assistance of a boat, will find his advantage in doing so, and going on to Courtfield, the Church of Welsh Bicknor, the Vale of Lydbrook, and by Coldwell to Whitchurch, visiting Symond's Yat by the way if he has time. Whitchurch may be made a resting point for a day or two; and from the ferry at New Weir the ascent may be made to Symond's Yat by a tolerable road, affording some good subjects. From New Weir the river must be pursued to Monmouth.

The town affords little scope to the photographer. From the Kymin Hill, a fine prospect is obtained both of the town and the adjacent country; but it is a walk of two and a half miles to get to the top. Thence you can descend on the other side to Staunton, the Double View, and the Bachstone. Troy House, near Monmouth, is worth a visit, and Raglan Castle, eight miles off, though a very hacknied subject, is yet worth photographing.

Having now achieved the tour of the upper section of the Wye, from Ross to Monmouth, proceed at once to Tintern by the coach road, which, unlike that from Ross, runs all the way beside the river. The Abbey, and the river from Tintern to Chepstow, constitute the climax of this charming excursion. From almost every point of view, the picturesque ruin affords a photograph, and of the charms of the interior I need say no more than that "J. N." took no less than twenty-four views of them, on as many plates! Here, then, is a field for the amateur! No wonder "J. N." calls it "a rich mine," or that it should have become so terribly hacknied. In every bookseller's window, in every town, slides good, bad, and indifferent, stare you in the face, and warn the ardent amateur, that the thing has been done, and over-done *usque ad nauseam*. Not a sixpenny provincial photographer but has his collection! Not a chemist's shop keeping "photographic chemicals," where you cannot obtain an ample supply! I had purchased one slide of the interior of Tintern, the best I ever saw. The gentleman who took it worked with wet collodion, and he informed me that, although he had gone to the Abbey at least half a dozen times subsequently for the purpose of obtaining another negative from the same spot, he had not succeeded in getting one so good as the first. So much for the certainty of wet collodion! I spent three days at Tintern, but to my shame I confess that I never once attempted the interior of the Abbey. Of course I saw it, not for the first time, for some decades of years have rolled away since the day I first beheld it, and was charmed with the beauty and elegance of its admirable proportions, far more beautiful in ruin!—but the reason was that my chemicals were capricious, and I had difficulty in making them work well. I, however, obtained twelve negatives of the exterior of the classic ruin from different points of view, besides others taken in duplicate. I much regretted that I had not provided myself with a stock of dry plates, and for the future I shall not travel without them. Besides, it often happens that in some localities you cannot find a level spot to pitch your tent on, nor can you always convey it and the inevitable box with camera and chemicals, up a craggy height from whose summit you desire to obtain a view. In such a case, dry plates are most advantageous, and I am perfectly satisfied that every amateur—at least, until the dry processes can be rendered absolutely and infallibly certain—will find the advantages of using both methods, and of not joining in the stupid, narrow-minded, contemptible cry of Wet *versus* Dry, or Dry *versus* Wet Collodion. No man is worthy of the title of photographer who is not equally master of both, and who does not work with one as well as with the other.

Let me here remark, that on the whole I prefer a developing box or dark chamber, which can be set up on a tripod stand to a tent,—having travelled with each. The additional advantage of the dark chamber is, that if you expose dry plates, you can develop them on the spot, or at the inn at night, and thus ascertain whether you have obtained a good negative or not before you leave the neighbourhood. If you find you have a failure, you can next day expose another plate. I have one of Leake's Portable Tents, which cost a guinea, and with some alteration I have had made to prevent the entry of the light in front, and two wooden supporters—one on each side—to keep it steadier than the iron rods would do, I have found it all that can be desired, not only for the wet but the dry process. You can sensitise and dry albumenised paper in it, and print proofs from your negatives, as I did when I got to Chepstow. An Archer's camera—one with his latest improvements—is, perhaps, better adapted for dry plates than any other, as they can be taken out and returned to the plate-box with the greatest ease inside the camera, which packs up in small compass, and is not too heavy to carry. I possess one myself, and therefore do not speak without experience. If you travel with a tent, have a pair of small light wheels to carry both it and the camera box. It is not always that a man or a boy can be had, and you are much more independent without them.

At Tintern there is no hotel, and the accommodation is of the most limited description. The fare is not such as would tempt a delicate or fastidious appetite, unless it be the season for salmon, which may be sometimes had in perfection; but travellers must make the best of what they can

get. The consequence of this is, that people stay at Chepstow, five miles off, and drive from thence to the Abbey and back, stopping at Wyndcliffe, and returning through the grounds at Piercefield. Such a drive is not to be had anywhere else, and exceeds anything I ever saw, whether in Europe or the New World. At Saint Arvan's, close by the entrance to Piercefield, and not far from Wyndcliffe, is an inn, where the amateur can take up his quarters, and I should advise him to do so if he wishes to take a stock of negatives from those celebrated spots. But if he merely does what I believe most people do, that is, drive to Tintern, spend an hour or so in the Abbey, and then drive back again, taking Wyndcliffe and Piercefield on the way, and then fancy they have seen all, although, even then, he will have no doubt revelled in inexpressible enjoyment; if, in short, he does not devote many days to the scenery from Tintern to Chepstow, he will be doing himself a great injustice, which he will not fail to reproach himself with afterwards.

Chepstow is a clean little place, with two very good inns, or hotels rather. The Castle is the chief attraction to the photographer, and the best views of it are got by crossing the bridge, or from the bridge itself. I ought to speak with reverential feelings of this venerable ruin, since I believe I am one of the few living descendants (maternally) of the gallant Sir Nicholas Kemeys, who, with a handful of men, defended it so long against Cromwell. Surprised at so protracted and obstinate a resistance, Cromwell quitted the place, leaving the siege to be carried on by Colonel Ewer, who would probably not have succeeded, had not at length the provisions of the garrison failed them. Sir Nicholas Kemeys had only one hundred and sixty men with him, of whom a hundred and twenty became disabled from want of food. At this conjuncture, the parliamentary army made a desperate assault on the Castle, and the walls being now comparatively undefended, they at length succeeded in effecting an entry at the western gate. Sir Nicholas and his forty emaciated soldiers, disdaining to surrender, for some time with Spartan heroism kept them at bay, till, overpowered with numbers, the gallant band fell, fighting to the last, not a man being taken alive. The rest of the exhausted garrison, in a state of starvation, were made prisoners, and so important was the possession of this fortress deemed by the parliament, that on hearing the news of its capture, they voted £50 to the messenger who brought it, and also passed a vote of thanks to Colonel Ewer and his soldiers.

On the Gloucestershire side of the Wye, some good views may be enjoyed, and the drive to the Double View, Tidenham Chase, and the Devil's Pulpit, should not be dispensed with.

Trusting that these hasty memoranda may prove of service not only to "J. N." but to other amateurs who may contemplate a visit to the locality, I beg to subscribe myself, sir, yours, very respectfully, R.

Proceedings of Societies.

Blackheath Photographic Society.

The nineteenth ordinary meeting of this Society was held on Monday, November 21, the President, J. Glaisher, F.R.S., in the chair.

The customary business having been transacted, Mr. A. J. Melhnish read the following paper on Photographic Printing:—

There are, I think, few things which appear more easy at first, and more difficult as our experience increases, than photographic printing. I well remember my first print; it coloured rapidly a delicate purple brown, not a tinge of yellow in the sky, and I thought that although the negative process was rather difficult, positive printing was easy and certain. Little did I then conceive how much I had still to learn ere I could produce such results at will. I have now, after many years' experience in this branch of photography, become acquainted, I trust, with every difficulty connected with it, and I am anxious to impart, as briefly as possible, to such of our friends as may not have had much experience in the art, such information as may be interesting and useful. I may here mention that I shall confine myself this evening to a purely practical view of the subject, not that I do not value the efforts of the chemist and of the philosopher—indeed, nearly all our hopes rest on them—but that I think it well to leave this to the performance of abler hands. It will, I think, assist me in forming a clear view of our subject, if we consider separately each object we wish to attain in photographic printing, and the means best calculated to secure it.

1. Having produced a good negative, our first care should be so to protect it by varnish that a large number of copies may be printed from it, without injuring the film. There is at present no better article made than that known as the French varnish; it requires the plate to be warmed when applied, and left about a day to get thoroughly hard.

2. As, unfortunately, our negatives are seldom perfect, our next object is, by the process of doctoring, to hide as much as possible whatever defects there may be. This, I am aware, many object to; but as I am at a loss to see any foundation for such objection, I shall not stay to consider it. We generally find that when a negative has been sufficiently exposed (a thing, by-the-bye, of most uncommon occurrence) the sky is so much weakened by excess of light, that it requires filling in, and the best thing for this purpose is a mixture of lamp black and neutral tint. I use Reeves' moist water colour tubes, with a little ox-gall. It is sometimes required to shade some portion of the picture which prints too dark, such as, for instance, the face of a portrait; this should be done by applying a little lamp black on the plain side of the glass, and, when nearly dry, soften off by the finger or a piece of rag. Many a negative, otherwise tame and poor, may be made to produce brilliant proofs by judicious application of this method of treatment. Having done all required in this way, varnish again with amber varnish; if shaded on the back, varnish that also, and, should the sky ever become sticky, sprinkle it with whitening.

3. Our object now is to obtain a sheet of sensitive paper which will give from a good negative a brilliant proof: this, I find, provided the positive paper be good, depends much on the amount of silver deposited on the surface of the paper. I therefore float the paper in a 75-grain solution of nitrate of silver for about two minutes, then hang up by one corner; when nearly dry I float again for the same time, and hang it to dry by the opposite corner. I may add that a strong negative requires to be printed in a strong light, and *vice versa*.

4. Having obtained a print of sufficient intensity, our next object is to tone and fix it, and upon this part of the process the beauty and permanency of the print mainly depends. Up to this point all is easy and certain, but now phenomena of the most peculiar and diverse character appear. Now is the time to produce that "abominable yellow," which so deeply affected Mr. Sutton—now spots scarcely visible become stars and then comets, with long flowing tails—now we may obtain that green, that strange green, which is too well known to need description, and which, for want of a better name, I would call the *old hypo. green*—now delicate copies of the cuticle may be seen delineated upon the sky, and now may be witnessed that very interesting phenomena of brown patches growing out of nothing; indeed, there is scarcely any limit to the spots, and stains, and sickly hues which it is our privilege occasionally to witness at this stage of the process; but, on the other hand, now may be produced a picture so chaste—so exquisite—so truly beautiful, that I know of nothing which will bear a comparison with it; there is a transparent bloom upon a fine albumen print that is possessed by nothing else.

The following are the two methods I now adopt for fixing and toning: the first when a purple or reddish brown is required, the second when a violet tint is preferred:—

First.—Well wash the print in common water, fix in new hypo., 4 ozs. to the pint, leaving the print in about five or ten minutes; then tone in a new bath of, gold 1 grain, silver 1 grain, hypo. ½ oz., distilled water 1 oz., first dissolve the hypo., then add the gold, and last the silver, warm the solution in cold water.

Second.—Wash the print with particular care, tone in, gold 1 grain, carbonate of soda 1 grain, distilled water 1 oz., in a few minutes the picture will be toned; then fix in hypo. 2 ozs., water 1 pint, leave in about five minutes.

5. Having now obtained a perfect print, our only object is to keep it so, consequently we stop the action here by carefully and thoroughly washing out every trace of chemicals which do not form a portion of the picture. A print should not be washed less than twelve or more than twenty-four hours, the water should be changed constantly, and the print wiped often on both sides with a sponge. Respecting the failures, the small spots may generally be avoided by keeping the paper dry, and, if possible, warm, until it is toned. The "abominable yellow" may be avoided by washing the prints before toning, and the detestable green by using the toning and fixing baths new.

Having had occasion several times to use the word "negative" in relation to photography, allow me to protest against this *absurd misnomer*,—indeed, it is more than absurd; I do not hesitate to say,

that it is a positive hindrance to photography. Many an one, who has no practical knowledge of the art, would understand us if we told him that our pictures were printed from a *reversatice*, whereas it is *impossible* to convey the faintest idea of what we mean to such an one by the astounding assertion that we produce our positives from a negative. When, whilst washing our picture, we see to our indescribable dismay the film slip quietly off the plate into the sink, then, indeed, may we boast a negative; but let us no longer call that a negative which produces such positive results.

Mr. R. P. Napper was proposed as a member of the Society, and a vote of thanks having been tendered to Mr. Melhuish, the meeting adjourued.

Miscellaneous.

If you will take any one well-frequented prosperous street in this metropolis, and ponder and be patient a little, a flood of things, quite new since the first wearing of that cap of yours, will come upon you. Try and remember a street as you saw it iu eighteen twenty-nine, or, as I saw it, in eighteen thirty-nine. What strange novelties eighteen fifty-nine offers to our inspection! Look at the photographs. Could we do without photography now? And yet when the gloss was on the cap we could only go, if we wanted our portraits taken, to the gentleman in Soho or Fitzroy Square, who painted us in oils, with the column, the curtain, or the cut orange on the plate, with an unnatural shirt collar, clothes too new for us, and eyes staring into vacancy. For miniatures, there was the fashionable artist in a shawl dressing-gowu and a Turkish cap, who stippled us up in ivory, with pink eyes like a white rabbit or au albino, an elaborate gold chain round our necks, and a highly-finished Buhl inkstand, with a great quill pen to break the dark background on the curiously arabesqued table-cloth. Cheaper performances "in this style" were undertaken by modest practitioners, who dwelt in second floors of the Strand or Oxford-street, aud exhibited gold frames full of specimens on the street door; simpering ensigns in scarlet, and languishing ladies with low-necked dresses, evidently copies iu water-colours from the "Book of Beauty." Photography has swept all these poor mediocre artists away. Some, the better section, have started up again as first-class photographers, or find employment in colouring to miniature texture the productions of the sun aud lens. Others, the more inferior, take photographs, abominable in quality, for sixpence and a shilling, in vile little slums—Sunday being their great market day. There are legions of people abroad on the Sabbath who have their portraits taken for want of something better to do. Some, the very worst, may have sunk into the touters who stand at the doors in the aforesaid slums, with shilling specimens in their grimy hands, wheedling or bullying the passers-by to come into their masters' murky studios and be libelled on glass. And some poor wretches, for aught I know, may be picking up sorry crumbs as photographees, sitting as models for the personages in those stereoscopic slides which look so curiously like life, and so hideously unlike it, showing their bleared faces and crinolines and legs, and playing their miserable antics for a penny wage. Most noteworthy feature of the things that have taken possession of London since this old cap was new is this stereoscopic mania. It is very good, I think, to look on marvellous transcripts of nature, to peep through two little holes at a scrap of cardboard, and say: There are the Grandes Mulets, there is the Court of Lions, there is the Alameda of Seville, not to have seen which is not to have seen a wonder. There is Mount Hor, there the Mount of Olives, there the church of the Sepulchre, there the place of Job's tribulation—not as painters and poets have imagined them, but in their actual, terrible reality—barren, sunburnt, arid, desolate. See; that little speck among a thousand heads is Queen Victoria. By her side is Eugénie, iu a white bonnet; that little dark streak is the real life-like twist of the moustache of his Imperial Majesty Napoleon III. These are not phantoms; they are real, and the sun cannot lie. It is good, I say, to look into these magic mirrors, and the reflective man may glean many and salutary lessons from them; but how does it stand when we come to photograph humanity tortured into the similitude of au ape, or caricatured into sham angels and sham ghosts? What a cold, pallid glare is thrown by the stereoscope on the deliberate indecencies the knaves have striven to perpetrate. Faugh! take away this miserable wresting of sunbeams, this forcing them to irradiate dust-heaps and sewers. Not to be denied, however, is this great fact of photography; very potent and various in its usefulness at this time—and all since this old cap was new! It has taken giant strides from its little dim cradle, full of misty shadowings of corpse-like colour, and distorted parts called daguerreotypes. Photography is everywhere now. Our trustiest friends, our most intimate euemies, stare us in the face from collodionised surfaces. Sharp detectives have photographs of criminals of whom they are in search. Foreign police agents speculate upon the expediency of having the portraits of travellers photographed on their passports. People are photographed on their visiting cards, or have tiny albumenised portraits of themselves in the crowns of their hats. There are photographs so minute as to be invisible, save under the microscope. They photograph infants and dead people. I was in Bedlam the other day, and the kind physician showed me an album full of photographs of the mad folks. There was Case XVI., raving in acute mania, hair erect, eyes starting, muscles distorted, mouth convulsed, hands clenched, limbs thrown here and there; and lo! on the opposite page was Case XIV. again, in a lucid interval, clean shaven, prim, demure, with an irreproachable collar, a white neckcloth, and a faultlessly-buttoned coat. Could the old mad doctors ever have dreamed of this, among the phantasma of chains, manacles gags, whips, and whirligig chairs, among which they kept the stricken people? What sore and terrible an astonishment photography would have been to them in the days when their old caps and three-cornered hats, their powdered whigs, and golden-headed canes were new! This photography seems an obedient slave, and has never claimed any fierce or arrogant mastery. It has never blown any one up, or rent anybody asunder, or maimed anybody; though a skilful photographer tells me that the art may yet exact such penalties for extreme rashness or dense stupidity. The worst harm it has wreaked has been to stain a few manipulators' finger-tips a little. It is not free from vice: witness those semi-ribald stereoscopes; but it abhors the crimes of violence. My cap is but middle aged, but when it is in truth old, and covers a bald, wrinkled head, what marvels may not have beeu added to photography! Of course it is in its infancy. Steam, you know, is in its infancy. So is ballooning. So is cotton-spinning machinery. Crompton's mules and Hargreave's spinning jennies will be preserved as curiosities iu museums some day. And we go maundering on about things being in their infancy in this old old world, till our hair falls off and our teeth fall out, and we, too, are in our infaucy, and Goody Crossbones comes and tucks us up, and gives us a spoonful of that Daffy's Elixir which lasts us till Trumpet-time.—*All the Year Round.*

The Photographic Society of London will open their Seventh Annual Exhibition of Photographs early in January, iu the Gallery of the Society of Painters in Water Colours, 5, Pall Mall. The exhibition will not be restricted to members of the society, but open to all, subject to the following regulations, viz.—1. Negative and positive photographs of every description, whether on paper, glass, or other material, including daguerreotypes, will be admitted, and also stereoscopic pictures and stereoscopes. 2. Coloured photographs will be admitted only when accompanied by untouched copies of the same pictures. 3. Positive pictures, printed from touched or painted negatives, and also touched or painted positive proofs, must be described accordingly. 4. For the sake of economising space, the margins of all mounted photographs must be kept withiu moderate limits, viz., not exceeding three inches for the largest pictures, or two inches in those under eight inches by six inches. 5. Pictures sent for exhibition must be numbered consecutively, and accompanied by a schedule in a form prescribed. Every picture must be protected by glass, and bear on its front a duplicate of the entry on the schedule referring to such picture. 6. All pictures with advertisements will be rigidly excluded. 7. Exhibitors desirous of selling their pictures will be permitted to make arrangements for that purpose with the attendant in charge of the exhibition. 8. Facilities will also be given to the makers of photographic apparatus, &c., for the exhibition of such of their productions as may be considered of peculiar interest from excellence of construction or novelty of invention. 9. All works intended for exhibition should be addressed to the Secretary of the Society, and delivered at the Gallery, 5, Pall Mall, with all expenses paid, on the 27th of December. Exhibitors and members of the society will have the privilege of free admission, and of introducing one friend without payment.

The Invention of the Collodion Process.—There has always been a difficulty attending the definition of the word "invention." It is evident that the work of many ingenious minds may intervene between the person who first starts a crude idea, and him who perfects it, and not unseldom does it happen that each individual in the series may have some title to the name of inventor. A first crude idea may be a long way from a practical discovery; and a perfect practical embodiment of that first idea may have claims far beyond those of mere adaptations or modifications. Thus, the Marquis of Worcester, in his "Century of Inventions," published A.D. 1663, proposes to raise water by means of an engine, worked by the expansive power of steam—a bold but crude idea, worthy of the ingenious mind of its author. But the noble marquis had too many such inventive irons in the fire, and this, like many others, was flung like a bone to less imaginative, but more practically inventive minds, who ultimately succeeded in extracting the marrow. A Captain Savery was the first to try his hand upon it, and constructed an engine for the purpose of pumping water out of the mines; but wishing disingenuously to obtain the credit both of the idea and its application, he bought up and destroyed every copy of Lord Worcester's book that he could obtain, and then gave out that he had discovered the motive power of steam by accident. Had he taken the trouble to investigate, he might have discovered that he was already long forestalled, for the truth (according to Lardner) is, that the employment of steam was of far older origin than the time in which the Marquis of Worcester laboured, dating at least as far back as Archimedes. It might satisfy our reader's sense of justice to know that the gallant impostor's engine turned out a complete failure. After him, in 1712, came Newcomen and his partner Cowley, who actually constructed and employed successfully an engine for the purpose originally aimed at by Savery, on principles which are in force at the present day. Here, then, we find the true inventors of the steam engine, for the subsequent successes of Watt can only be regarded as brilliant improvements. And so it was with collodion. The mere suggestion of its probable utility as a photographic agent is an inventive idea very different from the discovery of a practical process such as Archer's. And although it may be very true that Monsieur Le Gray and many others may have suggested the employment of collodion in 1850—nay, that they may have actually succeeded in obtaining some encouraging results in the course of their experiments (a point, however, by no means authenticated)—there can be no denial that the process of Mr. Archer, published *in extenso* in 1851—a process now universally employed, and which has received little modification and less improvement since its first announcement, was the first satisfactory application of collodion to photographic purposes, and that as such he alone is entitled to claim the honours of invention.—*Irish Metropolitan Magazine.*

Photographic Notes and Queries.

INSTANTANEOUS PORTRAITS.

Sir,—When we go into an ordinary photographic gallery to have our portrait taken, we are asked, probably very politely, by the artist, to sit down; he then brings opposite to us his machine, and scrutinises us through a cyclopean glass eye, telling us all the time to keep our eyes well open, to look at his hand, or at some mark on the wall, to keep our features inflexible, not to have our mouth too closely shut, &c.; and then there is a long adjustment required to make our hands look less awkward, to prevent their appearing as large as the face in the picture; but, whilst doing this, we forget what he has previously been impressing us with, and bend down to look; then all has to be gone over again, and this time, if we escaped it before, he screws an instrument of torture, called a head-rest, behind our ears.

But I will suppose that we are regulated, making every effort to appear very steady, and straining our eyes to keep them from blinking; the operator retires to his sanctum, and quickly reappears with something under the elbow of his coat, pops his head under the velvet, gives a last look, inserts his slide, admonishes to remain steady, draws off the brass cover, now. We strain every nerve and muscle to keep positively rigid, a mesmeric haze comes over our eyes, and although he asserted he would take us in *only* twenty seconds, we feel it a full hour. * * *

The dripping picture is shown us in the artist's hand; he bestows many encomiums on it, asserts it is very fine, charming, beautiful, &c., for experience shows him the surest way of persuading others is to appear convinced yourself. If we differ in our opinion, he at once tells us those qualities will be most apparent when it is coloured. But what is it really like? Why, nothing but the sitter at that particular time; it is, indeed, a faithful record of the tension of his nerves or the efforts of its mental disquietude, and if the sitter has been less frightened, and *attempted* a smile, the probability is that photography has recorded a smirk or egregious grin.

And yet, this need not be; it is quite possible to catch the varying expression of the countenance, to depict the kind look of thoughtful benevolence, or the soft tenderness of the love-kindled eye, the graceful look of vivacious pleasure, or the brilliant smile of gladness and joy.

With a quick lens and good chemicals, all this is possible; but it would add greatly to the certainty of the process if manipulators would be content with small pictures.

Perhaps my illustration of ordinary photographing is a little exaggerated; the great want in such pictures is an appearance of mind; there is too little animation even in the best, but this would not be if operators got into the way of taking instantaneous pictures.

Above all things, beware of making your subject nervous, by focussing and preparing. I would suggest that the artist employ an assistant, possessed of the great quality of making the sitter feel at ease, by chatting pleasantly, relating some agreeable anecdote.

I will suppose that he has managed to get his subject seated, and that he stands at the side in such a way that the sitter, when looking at him, may display a full or three-quarter face to the camera; now let the manipulator, who has been adjusting, stand watching, and, when he marks a smile or agreeable play of the features, draw the pin of the falling slide: thus, a correct picture may be taken before the subject is aware of it, and, as the expression of nature is preserved, and the *mind beams from the resemblance*, it cannot fail to be valued.

This is a subject of much interest to photographers, and I would gladly continue it, did I not fear that my communication is already too long; however, should it be pleasing to our excellent editor, I will recur to it in a future number. I will now only add, for the benefit of those who may be disposed to try instantaneous portraits, that they may, with ordinary good lenses, be taken one-sixth or one-ninth size, and afterwards enlarged without any perceptible loss of definition, two or three diameters.

E. B. Fennessy.

Ballyhood House, Cahirconlish, Co. Limerick.

THE ACTION OF LIGHT UPON NITRATE OF URANIUM IN THE PRESENCE OF STARCH.

We extract the following from a contemporary:—

"I have repeated an experiment by Dr. Phipson, in which an *organic* colouring matter is stated to be produced when starch covered with a solution of nitrate of uranium is exposed in a flask of white glass to the action of light. The only notice of this experiment which I have yet seen has been a casual paragraph in the "Photographic News;" therefore my deductions from, and explanation of, the phenomenon may have been anticipated. Nevertheless, as I believe that an incorrect idea of its cause was, and perhaps is, still entertained, I volunteer an explanation grounded upon a chemical analysis.

"Wheaten starch to the quantity of about 20 grains was shaken with a saturated solution of nitrate of uranium in a

phial of colourless glass, which was then placed opposite a window. After three days a darkening of the starch deposit was distinctly noticeable, and after a week, enough of the coloured product had been obtained to admit of its examination.

"The deposit was collected upon a filter and washed with distilled water until the washings gave no indication of the presence of the metal. The starch during this operation still retained its purple tint, but when the washing was concluded the colour gradually faded to yellow. The mass was next ignited, the ash treated with nitric acid, in which it partly dissolved, and the solution finally diluted with water and evaporated to dryness. In this way a residue was obtained of a yellow colour, very soluble in water, and giving with reagents all the indications of a uranium salt.

"I argue, therefore, that the coloration of the starch is to be attributed to the reduction of the peroxide of uranium to the state of protoxide; nor do I think that any "organic" compound of the oxide is formed with the starch, but that each starch-granule becomes covered with a coating of it. This is, I think, amply proved by the fact that the purple changes to yellow as soon as—removed from the protective influence of the solution—it is exposed to the action of atmospheric oxygen.

"The fact of this coloration is in itself very interesting, both in its chemical and photographic bearings; and I shall be glad to hear of additional experiments in the same direction. "H. N. Draper, F.C.S."

POISONING BY MEANS OF CYANIDE OF POTASSIUM.

Sir,—Allow me to call your attention to a report, which appeared in the *Weekly Dispatch*, of the 13th ult, of an inquest held on Wednesday, the 9th instant, at the London Hospital, on a young female, who committed suicide by taking cyanide of potassium, in which report it is stated that sulphate of iron is an antidote. If such be the case, it will be obvious that your pages are the proper medium for communicating the fact to the photographic world, as such occurrences and accidents, from the incautious use of the cyanide, are more frequent amongst them than amongst any other class. And as sulphate of iron is usually to be found on the shelves of the photographer, it is a pity that more information is not given as to the quantity to be administered, &c. Such information, I am sure, would be a boon, and, in the case I have named, might, perhaps, have saved life.

J. Walter.

[In our 22nd number, vol. i. p. 264, we stated that the ordinary positive developing solution, made with protosulphate of iron, is the best antidote to the poisonous effects of cyanide of potassium. If necessary, it may be taken internally, in excess, without danger (unless other substances of a deleterious nature have been added to it, such as nitrate of baryta, in excess, or perchloride of mercury), or it may be applied externally to a wound, if cyanide of potassium has got into it. The presence of a little nitric or acetic acid is of no consequence.—Ed.]

ARRANGEMENT FOR WASHING PRINTS.

Sir,—I have lately found the following arrangement answer very well:—Procure a porcelain dish with a *deep* spout, and place it under a tap, with the corner opposite to the spout raised about an inch above the level. Then take a glass tube, and bend it into the form of a syphon, the shorter leg being of the exact depth of the dish, and the angle, rather flattened, lying well in the spout. A groove cut in the side of the dish to receive the tube would be a better arrangement, but the former plan will answer. By this means, whenever the dish is quite full, it immediately empties itself *from the bottom*, and thus the water is constantly changed without trouble, and the soaking of the print is effectually secured.

W. J. D.

TO CORRESPONDENTS.

M. A. O.—Your interesting letter arrived too late to be noticed in our last number. We are much obliged for the stereograms inclosed—M. S.'s house especially. We shall also be very pleased to receive a good print of the beautiful little village when you succeed in obtaining a better negative. The stereograms show great improvement, more even than we could have expected in the short time; with perseverance you will soon be able to take them equal to any one. No. 1 is not very good, owing to the absence of half-tone; a little longer exposure in the camera would have improved it. No. 2 has the same fault; the subject is, however, a difficult one to copy correctly. No. 3 has too much sky in proportion to the rest of the picture. A good general rule to observe in such cases, is to fix the camera perfectly level, and then, by means of the sliding front, raise or lower the lens until the picture consists of two-thirds sky, the horizon forming the boundary line. No. 4 is tolerably good, and No. 5 very good: a little longer exposure would have removed the hardness in the light parts, and then the picture would have been perfect. No. 6 is a very difficult subject, and would require a very clear day. Do not attempt such views at present, except under very favourable circumstances. You will not meet with the anticipated success with the water developer referred to. Pure acetate of soda should be used, and that you would hardly be able to make; use, in preference, the pyrogallic developer given at vol. I. p. 24, employing rather less acetic acid in cold weather The cause of the mark on the print inclosed is the dark frame, which was not perfectly wiped out after using, and before another plate was inserted.

P. M.—1. The stop cannot be in the right place. Insert it immediately before the front lens, and almost touching it. 2. The bath has an accumulation of alcohol and ether in it. Expose it to a gentle heat, in an open glass vessel, for some hours; replace the water that may have evaporated, and then filter and acidify, if necessary.

Wax.—1. It will hardly have sufficient consistency to do without a glass in front if very large sheets are used; small sheets (7 × 9 and under) can very well be fastened on to the pasteboard, and exposed without glass. 2. The wax should be bleached. 3. About ten times the exposure of collodion. 4. 1,000 grammes of water, by weight, measure 1 litre.

W. May.—1. We do not know where really good albumenised paper can be got to be depended on. Your cheapest and safest plan will be to prepare it yourself. 2. 4½-in. aplanatic lens is very good; so also is the other kind named: we should rather prefer the former. We shall be glad to receive an account of your "reversed" photograph.

A. G. C.—It is a difficult plan to detect the presence of free nitric acid in the silver bath. If the bath is acid, and you have reason to suspect that the acidity arises from nitric acid, neutralise with carbonate of soda, filter, and then add a drop of acetic acid.

Constant.—A good formula for taking alabastrine photographs was given in No. 15 of the "News." We shall be glad to hear of the things mentioned. The developing solution must be washed off first, and then the syrup poured on.

Sunbeam.—1. The varnish is not good. Your best plan, under the circumstances, is to pour good spirits of turpentine over the surface, and then drain it off, and dry at a gentle heat. 2. If four stamps are sent to our office, the required number will be forwarded.

W. J. C., Exon.—The picture arrived totally smashed, as you might have expected when you inclosed the glass plate in an envelope unprotected in any way.

Photo. beyond Railways.—The article is accepted with many thanks; it will be a great boon to many of our readers during the approaching dull season. We shall be pleased to hear further from this correspondent.

Glasguensis.—Fluoride of silver was meant; it was a misprint. We shall be very pleased to hear what success you met with in your experiments with this salt.

W. S. Moyle.—The regulations of the Exchange Club can be seen on referring to Nos. 30 and 53 of the "News." Your name shall be inserted in the next list.

H. D.—The pictures are very excellent, and speak well for the calico tent in which they were taken. We have seldom seen their equals. We will have them repacked and left at the office, if your carrier will call.

Diddler.—We do not know a recent book on the art. Napier's Electrotyping Manual is, we believe, the best.

E. A. H.—Use the wet collodion process on glass for negatives, and print positives from these on good albumenised paper.

H. Bellini.—We should be pleased to communicate with this correspondent, but do not know his address.

Piscator.—At vol. ii. p. 286 there will be found a good formula for transferring glass positives to paper.

T. Greenish.—Articles on the subject are in preparation, and will be given in an early number.

J.—You should have evaporated it down in a clean glass or porcelain vessel. The tin has spoilt your bath.

J. G. B.—We are sorry we can get no information on the subject. The suggestions contained in your letter will be made to the proper parties.

W. H. Hawkes.—We do not think the plan could be made to answer. Your suggestion shall be considered.

J. Beldon.—The pictures are very good ones. We can point out no particular imperfections in them.

R. H.—We cannot recommend any particular maker.

Oriental.—Add more crystals of nitrate of silver to the bath, filter it, and then acidify with acetic acid.

W. G. G.—Aplanatic.

N. O. T.—The solution should be kept in a glass bottle.

P. W. Jones, T. Clark.—Received.

Communications declined with thanks.—Omega.—P. and Co.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—T. R. E.—Un Amie.—Isa.—Walter.—O. O. G.

In Type:—B. M. Brackenridge.—M. A. Root.—Oxouiensis.—An Admirer of the "Photo. News."—H. M.—W. H. Jennings.—G. M. Ferri.—H.—A Subscriber.—W.—G. H. W.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 66.—*December* 9, 1859.

In another part of our columns will be found the report of the meeting of the London Photographic Society; and we can easily fancy that our readers, on looking it over, will rub their eyes, and ask themselves, "Is it possible that this can be a correct report of the proceedings at a meeting of the London Photographic Society?" and then, as they read on, will become still more incredulous; and, finally decide, in their own minds, that it must be a mistake, and that a class lecture has been, by some accident, substituted for the paper which was promised at the previous meeting. We can assure them, however, that there is no mistake as far as we are concerned, and that this lecture was actually delivered, as nearly as possible in the words we have given. When we heard the lecturer commence describing how to clean a plate, we could not help thinking that we must have got into the wrong place; and that, instead of being at a meeting of the Photographic Society, we had inadvertently entered Mr. Hardwich's lecture-room, at King's College. It was not surprising that members, at this point, looked at each other, as much as to ask, what does all this mean? We have nothing to say against the lecture, as such; it was unquestionably a very good one, and we could safely recommend Mr. Ennel as an able instructor; but, delivered to members of the Photographic Society—most of whom have practised the art for years—it was injudicious; and we protest against members being induced to attend the meetings by the announcement that a paper is to be read, in order that they may receive a lesson in the A B C of their art. Many of them not only forego other engagements, but come from considerable distances to be present at these meetings, and they have just cause to complain. We do not say that the Council knew beforehand what sort of paper Mr. Ennel was to read in this instance; but a sin of omission is as great as one of commission, and they ought to have ascertained the purport of it: besides, of what use is a Council if it does not do this? The functions they have to perform are not onerous, and surely the most important for their consideration is the securing of really good and interesting papers for the monthly meetings. If this object be not attained, why have any meetings at all? Where is their utility? We hope the Council will give this matter their serious consideration; for, if they do not, they may depend upon it the Society will gradually fall to pieces.

Perhaps it does not signify a great deal what kind of paper is read, provided it elicits discussion, but the meeting is expected to terminate at ten o'clock, and, if a paper occupies an hour and a half in the reading, there is no time for discussion afterwards; moreover, the manner in which the discussions are reported in the official organ, is such that members are actually afraid to speak. At the November meeting, for example, in the attempt to get up a discussion on lenses, only one of those who spoke did so at any length, and the statements attributed to him in the official report were so devoid of meaning that the natural inference on reading it was, either that the speaker had been misreported, or that it was an after-dinner speech, and he had taken his views of lenses through the medium of old port. We need scarcely say that the former was the case, and, as he had publicly stated that he should call the attention of members to the circumstance, we anticipated that we should hear him on Tuesday evening hurl the bolts of his wrath at the offending parties; and we almost trembled for the unfortunate editors and reporter, whom we expected to see overwhelmed by the torrent of his eloquence and burning indignation. Influenced, however, by milder and more benevolent counsels, he refrained from annihilating them, and nothing was heard of the matter. Still, it is a grievance which is felt by all those who address the meetings, as it is, naturally enough, assumed by members not present that the official report of what took place must necessarily be correct, and they are in consequence unable to form any idea of the real merits of the speaker.

As a contrast to the report of the meeting of the London Photographic Society, we cannot refrain from calling attention to the report of the meeting of the French Society, which follows. In the latter there was no lack of papers for reading, and it would be ridiculous to suppose that members of the English Society have less intelligence, or are less capable of relating interesting facts of which they have become cognisant in their experience. All that is required is, that it should be drawn from them by judicious treatment on the part of the Council, and that they should be secured against misrepresentation in the official report.

THE ECLIPSE OF 1860.

The following communication has been forwarded to the Abbé Moigno by M. Faye:—

* * * * You are as thoroughly aware as anybody can be of the vast distance which separates the announcement of a problem from its solution, and how much optical or mechanical genius is required to realise a purely practical idea; you were not surprised, therefore, when I spoke with so much warmth, at the Academy, of the instruments which M. Porro had constructed for my expedition to Spain, and of the experiments we made with them on the 15th March of last year, on the occasion of the partial eclipse of the sun. I believe these instruments, with the essays then made, will lead to important results in respect to astronomical observation.

I propose that an arrangement should be come to by all the observatories to post properly-qualified observers at different points along the part of the earth which will be covered by the moon's shadow, and these observers to be supplied with all the appliances which can assist in obtaining correct views of the various appearances which may present themselves in the course of this the most interesting phenomenon which ever occupied the minds of intelligent beings; these observations to be compared and combined with each

other, so as to obtain as perfect an idea of what takes place as the resources of modern science can give us. Everybody knows what these new resources are—the electric telegraph and photography. I intend to employ these in the restricted observations which I shall make in Spain, in the capacity of a simple volunteer. My programme is very simple; it will be confined to the examination of the luminous protuberances which manifest themselves during eclipses, and to submit them to sufficiently precise measurements, to finally decide between the different hypotheses which have been suggested by this mysterious phenomenon.

These hypotheses are divided into two opposite categories: one assuming these protuberances to be realities, the other assuming them to be merely appearances. As the Germans would say, it is a question of knowing whether they are objective or subjective. I am myself inclined to adopt the subjective theory. But what signifies the conflict of opinions, so long as we have not a firm base on which to ground our speculations—that is to say, measurements—worthy of confidence, which, hitherto, have been almost entirely wanting? It is easy to illustrate this by an example. Imagine one of those rose-coloured flames which have excited so much surprise, admiration, and diverse conjectures, since the famous eclipse of 1842, and place it, in imagination, at the height of the solar disc. If this flame forms a part of the body of the sun, its angle of position, taken in relation to the centre of the moon, will vary 6° during the total eclipse of 1860; if, on the contrary, this protuberance corresponds to some accident of the surface of the moon, the variation will be *nil*, or will follow a course entirely different. This remark, with respect to the angle of position, applies, *mutatis mutandis*, to the height: the whole thing reduces itself to measuring with precision, during the short duration of the total eclipse, these two elements necessary for geometrically defining the phenomenon. Now, the means hitherto employed have not been such as to lead to any conclusion; they have left us in the most complete uncertainty, and it is easy to estimate their uselessness by considering them in themselves. With the registering position micrometer, which M. Porro has been good enough to construct for me, I hope to remove the difficulty, and to furnish science with some decisive measurements.

Instead of determining each protuberance by reference to the moon's radius, I shall fix its position by that of the tangent corresponding to the disc of the moon. By a very simple device, which consists in dotting each measurement on a metal limb, I am no longer constrained to read the divisions of a circle after each measurement. By means of a small level fixed to the micrometer, I shall obtain the direction which will serve as the point of departure, although the telescope I intend using may not be provided with any measuring apparatus. In short, in the construction of this micrometer, M. Porro has succeeded in such a manner, that the measurements of height shall add themselves to one another in the order in which they succeed, so that they may be afterwards found, one by one, without any possible confusion. Certainly, if I had sufficient resources at my disposal I would operate otherwise. I would wish to have the assistance of an experienced photographer to take several impressions of these marvellous phenomena, with the aid of a good glass, or one of those powerful and easily-moved telescopes made by M. Foucault, while I was myself examining the details of the eclipse with M. Porro's helioscope; but forced to confine myself within narrow limits, I know of nothing better than the registering micrometer, of which I have just given an idea.

It is necessity which stimulates inventions. You would not have thought that an astronomer would make a journey into Spain to observe an eclipse without bringing back precise and valuable information on the subject of the interior contacts—of the beginning and end of the total observation; it is very difficult, however, to carry on all these operations at the same time. If it be desired to watch the luminous protuberances; to profit by the short duration of the phenomenon; to neglect nothing which may enable one to fathom it; astronomical observations must be sacrificed. I have not been able to reconcile myself to this; therefore, I reckon on managing the affair by intrusting an automaton register to observe in my place, and to do it better than I could do it.

Let us suppose that, one minute before the total obscuration, a photographic camera be directed upon the sun, and that, instead of the sensitive plate, a band of sensitised paper unrolls itself at the rate of two centimetres a second. So long as the sun emits his rays, an impression will be produced on the paper; but, at the instant of the disappearance of the last ray of light—at the sudden transition from day to night, which characterises total eclipses—the photographic impression will cease abruptly. Several yards of the paper would thus be unrolled to no purpose during the obscurity, until the re-appearance of the first solar ray which arrived to register itself by its photogenic action. The idea is still incomplete; it is necessary to cause the intervention of a chronometer in the apparatus, in order to measure the time elapsed. Nothing is more easy—theoretically, at least. Arrange so that the oscillating pendulum of the timekeeper intercepts the pencil of light from second to second, and you will have on the band of paper a trace of these interruptions; you may there count the hours, minutes, seconds, and even to the smaller portions of a second: a compass suffices for this. Such was the idea I submitted to M. Porro, and the Academy has seen with what talent he has realised it. In the first place, instead of a simple photographic lens, he has adapted a complete telescope object glass and eye-piece—the effect of which will be still more certain. Instead of interrupting the luminous pencil by the wire of the pendulum, he has caused the hammer of the bell to do this in such a manner that the break of the photographic image corresponds exactly with the stroke of the second. He has arranged the optical part so that a simple azimuthal movement will suffice to enable me to find the sun, and direct the instrument. It remains only to refer to the clockwork; and, as regards this, it is only necessary to mention that M. H. Robert has undertaken this part of the business. I shall shortly experiment on artificial eclipses with the complete apparatus, and we shall then see how it works.

Is it not singular that astronomy should have allowed itself to be left so far behind? For a long time past terrestrial physics has been in possession of registering apparatus to record thermic, electric, and magnetic pheuomena, in which photography plays the principal figure, while, hitherto, no application of this kind has been made to celestial phenomena.

The images of the moon, sun, and planets, notwithstanding the great importance which attaches to them, are as yet but mere portraits; if we except the stellar images of M. Boud, we may say that photographic *measurements* date from the 15th March, 1858, and the factory of M. Porro. The magnificent negatives which MM. Porro and Quinet then obtained with an object glass of 15 mètres of focal length are not forgotten. These negatives, prepared for the most delicate measurements, have established the following results:—

1. The hour may be determined photographically with the transit instrument, without the intervention of any observer whatever, and with a precision from which they are still very distant in all observatories.

2. On the proofs obtained with the aid of an object glass of long focus, the celestial co-ordinates of the smallest spots on the sun may be measured, and so give an unhoped-for extension of the study of the rotation and the physical constitution of that orb.

3. An eclipse may be observed photographically. This method, without surpassing in precision the observation of contacts, leaves far behind every attempt hitherto made to measure the height, or the orientatiou of the line of the horns, the thickness of the phase, &c.

I have just shown that the contacts themselves are in-

cluded in this general method, by which photography tends to suppress the observer, and, with him, all the causes of error so mysteriously allied to the physiological co-ordination of our senses. * * *

Allow me, in concluding this long letter, to call your attention to the objection I raised in the Academy to the curious and brilliant theory of Messrs. Watherston and Thomson, on the origin of heat and solar light. They were not quite pleased with you in England for having indirectly shaken this theory, by saying that you were not quite certain that the zodiacal light was an exclusively solar phenomenon.

WINTER PRINTING FROM PAPER NEGATIVES.*

The Sensitizer, which should have been got ready at the same time with the former solutions, consists of

Crystallized nitrate of silver	30 grains.
Citric acid	$1\frac{1}{2}$,,
Distilled water	1 ounce.

Float the marked side of each salted paper for exactly three minutes upon this, lift the paper gently up, pull it quite off with the tongs when it has been on the solution about thirty seconds, on the side towards the light—touch off any air-bubbles. If there are none, lower the paper, watching the liquid line as it meets it—if it glistens straight along to the corner you are holding, no new bubbles have formed.

The Exposure.—The printing-frame ought to be a light one, as, if the light is active you ought not to let it out of your hand. When you have placed the negative back to glass of frame and the sensitive paper against it, place also a little scrap of perfectly white paper, or blotting-paper, on the glass beyond the latter; spread a piece of cloth or velvet over the paper and shut in the back; then throw an ample piece of black, or black and yellow cloth, over the front of the frame, and so carry it to the light. We will suppose a cold day with rain hanging about, but a good deal of brightness, as if the invisible sun *might* come out presently. Twitch off the cloth and watch the strip of white that shows beyond the negative, beginning at the same moment to count aloud up to 100, as quickly as you can get out the syllables without slipping any. It will be some guidance to tell you that on November 5, such a day as is described above, you would have had at an east window, at about 11·15 a.m., to count up to 240, with a vigorous plain paper negative, by which time your white edge would have become a deepish maroon, and the *point* which, with such a negative, is, that all the details of the picture should be visible on the sensitised paper, save and except, if there be any gradations, those half-tones standing standing next to the skylight in paleness—also the next to these should be rather to be *fancied* than seen.†

It is of course better, unless the light be very inactive, not to open the back of the frame, in this sort of printing, to examine progress—unless, indeed, you please to carry it back first into the dark room. The use of watching the outside strip of the positive paper is, that the eye soon learns to know by it how all is within, and the scrap of paper remaining white near it, much helps the eye to judge. The counting helps to tell how long to expose a second picture in about the same light, and generally corroborates the judgment of the eye; but if the day be very dull it becomes wearisome, and may be omitted safely for the testimony of the outer strip and the examination behind. On dull days the *proportion* between the colour of the outer strip and the colour under the negative, is different—the actinic force that makes much of boring through the atmosphere to the naked paper, makes more still of boring through a paper negative—therefore examination of the state of the image, before removal, becomes more necessary.

Once for all; by greater or less exposure, get your outer strip to the decided maroon shade, slightly varying with negative and light as you find needed. Throw the cloth again over the frame when you think proper, carry both back into dark room, where

The developer is now concerned. This should have been made at least over-night, by putting about two scruples of gallic acid to eight ounces of rain, or sufficiently pure running-water, throwing in a bit of camphor, and corking the bottle well. Pour a sufficiency of this into a glass dish, or tray of stoutish well-dried paper (the time that such will hold cold liquids not chemically penetrating is surprising), and immerse each picture straight from the frame, taking care that every part is wetted by the liquid as nearly as possible with all the rest, and removing bubbles with tongs, brush, or still better with the rounded end of a glass triangle.

The example print mentioned above was put into the developer at 11.19 a.m., and drawn from it a perfect image, sufficiently over-strong to meet the toner or fixer at 12.4 p.m. It was then in colour a rich violet black—the outer strip black entirely, or *invisible* puce.

Two, three, four hours, or even more, will *sometimes* be required for development. There need be no fear of extending it while the lights and general cleanliness of the proof are safe.

Do not put more than three small proofs to each half-inch depth of the developing liquid.

Washing from the developer.—When you have a brilliant picture, clean, but exceeding in vigour rather to the loss of delicacy, take it from the developer and put it into a large bowl, or small pansion (I suppose $\frac{1}{4}$-sized pictures to be understood) full of cold soft water, for an hour. Do not use the same water for more than half a dozen together. Then put it into another bowl containing cold water, in which a good-sized piece of washing soda was dissolved when it was hot, and leave it there five minutes or more. It may then enter

The gold toner, which may be made by any approved alkaline or neutral formula. "The Photographic News," which, as most photographers know, will not furnish a formula of doubtful worth, even on a direct application for it, speaks in constant praise of a toning formula, recommended by a correspondent signing himself "θ," which I have found useful in the development process I am describing; but I generally use it at double strength in cold weather, putting twice the amount of gold, and twice the *lower* number of grains given of the alkaline salt (I rather prefer the borax to the carbonate of soda) to the same amount of water.

The example print took a quarter of an hour in this bath to get its whites blanched and its *over*-vigour toned down to the meeting point of the brilliant and delicate. Four minutes will sometimes be enough for these results. When they are obtained it is time to remove, and, till they are obtained, it cannot be too long to let remain,* for it is for their sake, *rather* than for the question of tint (for a well-prepared, well-printed, well-developed print of this order will face the fixing bath untoned, and leave it unstricken with sickliness of hue), that toning is recommended for development printing, though the question of permanency also comes in.

Tone till the said results are obtained, by which time your proof will be a nice slate-black. Rinse for half a minute, and immerse for not less than fifteen minutes, in

The fixer, consisting of six ounces of cold water to one of hyposulphite of soda. The fixer should be made fresh every day.

Washing from the fixer must be, as usual, for twenty-four hours, through seven changes in bowls, or for six hours in running water. Do not finish with *hot* water, or allow any change of the water to be other than cold.

To obtain a coloured photograph by the above process without toning.—Expose *in the sun* till the edge is a definite lilac grey and the details out into an entire pure picture, but *subdued* as yet. This was accomplished on November 3,

* Continued from vol. iii. p. 146.

† Remember, I am speaking of what *must* be got to obtain a brilliant picture. It must be a poor negative for any exposure that leaves room for development into richness, without distinction of lights, to hurt its impression.

* Whilst the action tending to them proceeds, that is: "There is a time," says a recent Essayist, "when a wise man sees that a thing unfortunately begun, or ill guided, will not improve."

in 200 counts. Immerse in developer, as usual. In about fifty minutes in cold weather, or less, the picture will be of the most brilliant deep dark damson-juice colour possible, and over-vigorous as needed.

Wash it well without soda, and fix in the hyposulphite without toning; the carmine will give place to an objectionable orange chestnut for the time, but when the proof has been well washed and dried, it will have recovered itself into a pleasant purply maroon. A picture so treated and toned will take the gold tints nicely, and be strictly *coloured*, if not toned too far, not merely of a black hue tinged with slate.

(*To be continued.*)

TRANSMITTED POSITIVES TAKEN DIRECT IN THE CAMERA.

The following is M. Poitevin's method of obtaining positives in the camera.

In the course of his photographic experiments on gelatine, he had several times obtained on developing the proof, first, a negative picture, then a direct picture much more intense than the first. This having happened again recently, he was reminded of what had previously taken place, and this led him to the new process, which is based on the following considerations:—

1. That a film of iodide of silver in presence of nitrate of silver, having been acted upon by light, is blackened by pyrogallic acid.

2. The same film acted upon by light, then washed to remove the nitrate of silver, and again covered with a solution of iodide of potassium in the dark room, again washed, and a solution of nitrate of silver poured on, is still blackened by pyrogallic acid.

3. The action, even though very short, of the light on the film previously impressed and covered with iodide, deprives it of this property of being blackened by pyrogallic acid.

To obtain direct positives, viewed by transmitted light, he used collodion iodised with iodide of potassium, but not so strongly as when used for negatives; sensitised in the usual way, and exposed the film for some seconds to the light, then washed freely, and put the plate up to dry, or else used it at once while still moist. He next poured on the plate a solution containing four parts of iodide of potassium to 100 parts of water; this was done in the dark room. When the plate is allowed to dry, this solution must be composed of the same proportion of iodide in alcohol instead of in water. The film thus impressed and covered with this solution is very promptly acted upon by the light which deprives it of the property of being blackened by pyrogallic acid; the solution of iodide having been washed off is replaced by a solution of nitrate of silver; and this surface is used for reproducing, in a direct manner, the image in the camera, the time of exposure being about three times longer than is necessary to obtain a negative with the same collodion.

After exposure in the camera, he washed the surface in distilled water to remove the excess of iodide of potassium, then plunged it in a weak silver bath and treated it with acidulated pyrogallic acid, which blackens only those parts which have not been acted upon by the light. In this way an image is obtained in which the whites of nature are depicted by the lights, and the shadows by more or less intense blacks.

The film, sensitised and covered with iodide, may be used some hours after being prepared, without any appreciable diminution of its properties; but, if kept longer, it will be spoiled, as the action of the iodide of potassium takes place even in darkness.

In these experiments he substituted lactic acid for acetic acid in preparing the pyrogallic acid solution.

By this method he stated that transparent positives could be obtained, which would be available for photographic printing with ordinary ink, in the way he had communicated to the French Society some time back.

Dictionary of Photography.

Iodide of Cadmium.—This salt is composed of equal equivalents of iodine and cadmium; it is largely used in photography, owing to its very stable properties when dissolved in collodion—no liberation of iodine, and consequent deterioration of the collodion, taking place. When large plates are coated with this kind of collodion, the cadmium salt is not found to be the best in practice, as it occasions a glutinosity and want of flowing properties in the liquid; but for small plates this defect is not so apparent. Iodide of cadmium may be easily prepared in the following way:—Take 7 parts of metallic cadmium in coarse filings, and 3 parts of pure iodine. Place them in a flask together, with sufficient spirits of wine to cover them well. Action will immediately commence, and the liquid will become very hot, and perhaps boil. Add more alcohol as it evaporates; and as soon as the combination is complete add more alcohol, and filter. Evaporate at a gentle heat, and the iodide of cadmium will crystallise out in the form of white nacreous plates.

Iodide of Iron.—A combination of equal equivalents of iodine and iron may be prepared as follows:—Add 40 grains of pure proto-sulphate of iron, in fine powder, and thoroughly mix it up in a mortar with 24 grains of iodide of potassium, adding a drachm or two of alcohol, and grinding well together for five minutes; then add alcohol to make up the bulk of liquid to two ounces, and place in a clean, well-stoppered bottle. A few inches in length of clean iron wire (pianoforte wire is the best) should be beat up and put into the liquid, in order to keep the proto-iodide of iron from becoming per-iodide. There will be a deposit at the bottom of the bottle, consisting of sulphate of potassa; this may be either filtered off or may be disregarded, provided the clear solution only be decanted for use. When it is required to iodise a little plain collodion for rapid work, 1 part of this alcoholic solution of proto-iodide is to be added to 3 parts of good plain collodion; but only a small quantity should be made at a time, as the iodised collodion will not keep many hours. Syrup of iodide of iron is made in the following manner:—Take of dry iodine 200 grains, fine clean iron wire 100 grains, water 6 ounces, white sugar, in powder, 4½ ounces. Boil the iron, iodine, and water together in a glass flask; at first gently, to avoid the expulsion of iodine vapours, and afterwards briskly, until about two fluid ounces of liquid remain; filter this quickly, whilst hot, into a flask containing the sugar; dissolve the sugar with gentle heat, and add water to make up to six fluid ounces. It is proposed to employ both of these preparations of iodide of iron in photography, and various processes in which they play an important part have from time to time appeared in our pages. They are, however, of very limited uses, being as yet unemployed in any important practical process.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Syphons.—The amateur having acquired some facility in working with glass tubes, as described in former numbers, will find a variety of occasions for the useful application of his skill. We shall, however, point out the methods of producing a few of the most frequently useful instruments used in the laboratory and operating room.

It is most important, and, at the same time, often difficult, as the photographer well knows, to be able to decant various fluids without disturbing the sediment or deposit at the bottom of the vessel. The best means of effecting this is by the aid of the syphon. Most of our readers know that any bent pipe, or tube, filled with the liquid in a vessel in which one end of it is immersed, will continue to discharge the fluid from the other end so long as the discharging aperture is below the level of the

fluid in the vessel. It is unnecessary here to enter into any detailed explanation of the influence of atmospheric pressure, nor to point out the practical limits to the length available for syphons, as it is not probable that the amateur will require to use one of more inches in length than the number of feet really available, if necessary.

The simplest form of syphon consists of a bent tube, with one limb longer than the other, like the engraving:—

The mode of using it is to fill it with the fluid, and. stopping both ends with the fingers, plunge the shorter limb into the liquid to be drawn off, the ends are then to be uncovered, and a current being established, continues until the vessel is exhausted, or the discharging aperture ceases to be below the level of the fluid. It will be obvious, however, that this form of syphon is always inconvenient, and often altogether inapplicable; as, for instance, if the fluid be corrosive, or if it be contained in other than an open or wide-mouthed vessel, the syphon could not be used.

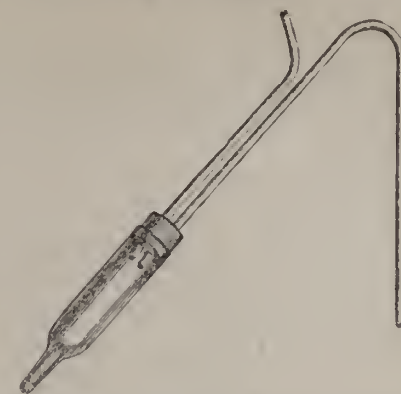
Another simple form of syphon, in which these disadvantages are obviated, is made similar to the last, but possessing a bulb in the longer limb, like the engraving.

In using this syphon, the long limb and bulb are filled with the fluid, and one end of the tube is stopped. The short limb is then immersed in the liquid to be decanted, and the end of the long limb unstopped. The fluid contained in this limb and the bulb are, of course, at once discharged, and the vacuum formed in the bulb, as the fluid flows out, causes the liquid in the vessel to rise up the short limb, and a current is thus established, which will continue. It is necessary that the bulb be somewhat larger, or contain greater capacity than the short limb. In making a syphon of this kind, the glass tube should be sufficiently stout to admit of a bulb large enough being blown. It will be generally found convenient in such a case to bend the tube first, and then stopping the aperture of the short limb, heat and blow a bulb in the other, as described in former chapters. Sometimes it is more easy to make and use the two limbs, if they are not joined at the bend. In such case, two separate tubes, sufficiently curved at each end to form a proper bend when their apertures are brought into contact, may be kept in that position by a piece of vulcanised India-rubber tube, fitting sufficiently tight, and wrapped with silk, to hold them both in their proper places.

The most perfect form of syphon for chemical purposes consists of a bent glass tube, like the first described, but possessing a suction tube, inserted near the lower end of the long limb, like the engraving:—

In using this instrument, the short limb is immersed in the liquid, and the end of the long limb being stopped, the air from the tubes is drawn off by applying the lips to the suction tube, when the fluid at once rises, and, passing over the bend, establishes the desired current. The method of piercing a hole in the side of a tube, and joining another tube thereto, we described in a former chapter. As this is a process, however, which requires some skill and practice to perform successfully, we will describe a method of making a syphon of this kind very simply and easily.

A piece of sufficiently wide tube, drawn to a somewhat small aperture, a long ounce phial, or, as Dr. Mohr has recommended, an eau-de-Cologne bottle of the long cylindrical kind—any of these answer the purpose—is first required. If either of the latter are used, the bottom must be cut off by any of the methods we have described, and a cork fitted to the aperture. A syphon like the first mentioned is then made, and the end of the long limb passed through a hole in the cork (the best method of perforating such holes we shall shortly describe). Through a similar hole, another tube for exhausting the air is passed, and a very convenient and easily-made syphon is thus produced:—



A very convenient mode of using the syphon, when the liquid is in a bottle, is to pass the short limb through a cork, by which it will be held in position, and unnecessary evaporation prevented.

Instead of using the mouth to exhaust the syphon, a convenient substitute is found in a vulcanised India-rubber ball, or bottle, attached to the suction tube, the size of which must be adapted to the syphon, always requiring to be of rather more than equal capacity. The best plan of using this is—force the ball into a state of collapse, the aperture of the long limb in all cases being closed, and, when the short limb is immersed in the fluid, allow the ball to resume its form, which, exhausting both limbs of the air, at once causes the liquid to rise, and then continues to flow. This syphon might be used by just stopping the aperture of the long limb, and, after inserting the short one in the liquid, expelling the air by compressing the ball; but in doing this the air is forced through the fluid, very generally effectually disturbing the sediment it is so desirable to avoid touching.

It is, perhaps, necessary to remark, that the length of the limbs of the syphon is calculated from the surface of the fluid, all beneath not being calculated; it is only necessary, therefore, that the discharging aperture be lower than the surface of the liquid to be decanted, to keep it running. It will be seen, therefore, that if the two limbs were of equal length, if one were inserted some distance into the liquid, it would thus become shorter, and act perfectly; but it is generally found, however, most convenient to have the instrument made with limbs of unequal length.

(To be continued.)

Photographic Chemistry.

NITROGEN.—(*Continued*).

An easy method of analysing the air is to take a graduated test tube and invert it over water, so that no additional air may enter; then pass into the tube a piece of phosphorus fastened to a bit of wire and leave it therein for about twenty-four hours, at the end of which time it will have absorbed all the oxygen; it may then be withdrawn, and the quantity of gas remaining will show the proportion in which nitrogen was present.

We come now to the consideration of those substances which are formed by the combination of nitrogen with oxygen. There are five of these compounds known, in which the quantity of oxygen, combined with the same quantity of nitrogen, may be expressed by the figures 1, 2, 3, 4, 5, thus:—

		Nitrogen.	Oxygen.
Protoxide of nitrogen	NO	14	8
Binoxide of nitrogen	NO_2	14	16
Nitrous acid	NO_3	14	24
Hyponitric acid	NO_4	14	32
Nitric acid	NO_5	14	40

Of these combinations three are acid; the remaining two

being indifferent. The most important of these compounds being nitric acid, we shall consider this first.

NITRIC ACID, NO_5.

By heating nitrate of potash, or *nitre*, as it is commonly called, with concentrated sulphuric acid, the feebler acid is driven from its combination, and distils over as nitric acid. This acid is of a yellowish colour, due to the presence of nitrous acid, or muriatic acid, arising from the intermixture of common salt with the nitre. It is very corrosive; and, if suffered to touch the skin, it stains it of a deep yellow. The strongest nitric acid which can be obtained consists of one part of water to six of pure acid: its density is 1.522; it boils at 186°. If we add a little water to this acid and distil it anew, the portions which pass over first contain more real acid than that which remains in the retort: a thermometer placed in the retort will gradually rise to 250°, at which point it will remain, and the liquid which distils over after this will present an uniform composition, being two parts water to three of acid. On the contrary, if we add a considerable quantity of water to the acid, the first portion which distils over will be almost pure water—the quantity of acid continually increasing—and the acid in the retort becoming more and more concentrated, until it attains the strength above mentioned. Pure liquid nitric acid, free from colour, may be obtained by mixing the first-mentioned acid with an equal quantity of oil of vitriol, and re-distilling it, separately collecting the first portion which comes over, and exposing it to a current of dry air made to bubble through it; the vessel containing it being a little warmed, and screened from the light. The action of this acid on metals and organic substances is very much weaker than when it is more diluted with water. In mixing this acid with its weight of water, heat is evolved, but, if it be mixed with snow, it produces intense cold. If a little freshly-made charcoal, finely powdered, be placed in a saucer and warmed, it will take fire, and throw out brilliant sparks on the acid being added to it. A very strong light is emitted by a piece of charcoal, if it is first made incandescent, and then put into a vessel, the bottom of which is covered with strong nitric acid. Oil of turpentine will take fire on the addition of a small quantity of nitric acid; but this experiment must be conducted with some caution, or the suddenness of the combustion may produce serious injuries.

In the first hydrate of nitric acid, the relation of the oxygen of the water to the oxygen contained in the real acid is as 1 to 5; its formula may be thus written—$NO_5 + HO$. In the second hydrate, the relation is as 1 to 5—$NO_5 + 4HO$.

Anhydrous nitric acid may be obtained by treating thoroughly dry nitrate of silver, heated from 120° to 140°, with chlorine; this changes the nitrate into chloride of silver, and white crystals of anhydrous nitric acid are formed on the sides of the apparatus. These crystals melt at 85°, and boil at 122°. At a temperature slightly above that at which it boils, it decomposes into oxygen and hyponitric acid. It has been known to explode spontaneously. It evolves considerable heat on being dissolved in water, and forms hydrated nitric acid. Its composition is 14 parts nitrogen and 40 oxygen.

The first hydrate is colourless when pure, but it quickly changes under the influence of light, and becomes of a yellow colour: the nitric acid is, in fact, decomposed by the light with the formation of oxygen and hyponitric acid, which is dissolved in the undecomposed acid. Nitric acid it will be seen, therefore, is easily decomposed, as also by heat, for if a portion be passed through a strongly-heated porcelain tube, it is decomposed into nitrogen and oxygen. This acid has a marked affinity for water, and in a humid atmosphere gives off fumes, hence this hydrate has been termed *fuming nitric acid*; this arises from its elasticity being greater than that of nitric acids containing large proportions of water at the same temperature. The second hydrate, $NO_5 + 4HO$, is much less liable to decomposition than the first; but it may be deprived of three-fourths of its water by distilling it with its own weight of concentrated sulphuric acid.

The electric spark will cause nitrogen and oxygen to combine and form nitric acid in the presence of water alone, or more readily, if a powerful base be present. The discharge of sparks must be continued a long time before any result is produced; a small quantity of nitrate of potash is formed in the alkaline solution.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 7th December, 1859.

M. Guillard proposes the substitution of citric acid for acetic acid in photography, and M. Davanne writes on this:—"A mixture of gallic and pyrogallic acids, in which citric acid replaces the acetic acid usually employed, has appeared to us very convenient in travelling for developing proofs in Taupenot's process (dry albumenised collodion); the image comes out perfectly. The reducing liquid preserves its clearness for a long time, and one has thus, in a very small volume, the quantity necessary for developing a large number of proofs. Here are the proportions we employ:—

Gallic acid	30 parts.
Pyrogallic ditto	10 ,,
Citric ditto	10 ,,

These substances are powdered down and mixed intimately in a porcelain mortar, and are inclosed in a *perfectly dry* bottle.

"It is sufficient to dissolve about 1 gramme in a large glass of water to have a liquid ready to develop a very large proof. By this method a number of weighings are avoided, and also the danger of breaking a bottle of crystalline acetic acid on a journey."

M. Jouet has communicated to the *Société Française* a new formula for a process on dry collodion, which appears to have been very successful. In the first place, it is necessary to prepare a varnish composed as follows:—

Yellow amber, in powder ...	20 grammes
Ether	40 cubic centimètres
Chloroform	60 ,, ,,

Let these substances digest for some time, and then filter. Add 4 cubic centimètres of this solution to 100 cubic centimètres of good photographic collodion, very rich in ether, in order to obtain more adherence on the glass.

The layer of collodion is sensitised in a solution of nitrate of silver, containing 8 per cent. of nitrate and 1 per cent. of nitric acid. This operation must be conducted with precaution, as, by the influence of the acid, the thin layer has a tendency to quit the glass. Care must also be taken to let the collodion dry for a minute or so before plunging it into the nitrate bath. When the surface is uniformly wet, it must be thoroughly washed with distilled water, and the plate allowed to dry, on its angle, in a dark room.

A plate so prepared preserves its sensibility for an indefinite period—more than twelve days at least. The time of exposure is double or triple that for wet collodion. To develop the proof, distilled water is poured on to the impressioned surface, then a solution of pyrogallic acid, containing 250 parts (grammes) of water, 1 part of pyrogallic acid, and 1 part of citric acid; a slight quantity of nitrate of silver is finally added. The proof comes out rapidly: it is fixed, washed, and varnished as usual.

A timid person, who has been talked to, in childhood, about ghosts, hobgoblins, animal magnetism, and so forth, would be rather alarmed, on opening some of our modern works on physics, and meeting with such words as "solar spectrum," "magnetic phantoms," "Moser's images obtained in the dark," &c.; and would, perhaps, grow pale at hearing that Professor Nicklès, of Nancy, has just succeeded in *fixing magnetic phantoms* in a new manner, which he communicated, last Monday, to the Academy of Sciences at Paris. The denomination of "magnetic phantoms" has been given to the curious figures that are obtained when iron powder is allowed to fall upon a sheet of stretched paper, held above the poles of one or more magnets. These figures indicate the lines of magnetic force which have formed the subject of many investigations by Faraday, and other distinguished physicists.

To fix these images, M. Nicklès employs waxed paper. When the "magnetic phantom" has been obtained (the paper being permanently fixed above the magnet), a hot

brick, or any other warm body, is brought near to it, care being taken not to touch the paper. As soon as the wax upon the paper is melted, the brick is taken away, and the wax, by cooling, fixes the particles of iron in the exact position they occupy under the influence of the magnet, for the latter has continued to act throughout the operation. An indispensable condition of success, in this experiment, is, that the layer of wax upon the paper have a sufficient thickness, in order to be capable of fixing the different groups of iron particles completely. This is the first time that these particles have been fixed in the vertical positions they take under the influence of the magnet.

M. Bœttger has invented a new copying ink, which is made as follows:—In a porcelain capsule, 1 part of alum, 2 parts of sulphate of copper, and 4 parts of extract of campeche wood (logwood), with 48 parts of rain water, are heated to ebullition, until all the ingredients are completely dissolved. The liquid is then filtered through a piece of linen. This ink has a violet colour, with a reddish tint, but the written characters it produces assume, in a very short time, an intense blueish-black hue. As to the copy, it is first of all rather pale, but soon acquires a dark blue colour. The ink thus prepared should be kept in bottles well corked, to prevent it getting thick by evaporation, and to prevent mildew.

Le Cosmos gives some interesting details on the physical geography of the Red Sea, from a paper by Dr. Buist. I shall extract the principal facts. The tide at Suez rises about two yards in ordinary weather, and a little higher at the equinoxes. The denomination "Red Sea" is derived from the appearance, at certain periods of the year, of large red spots on the surface of its waters. These spots, which are generally of a deep blood-red colour, vary in dimensions from a few square yards to some square miles. They are owing to an infinite number of microscopic organisms, whether vegetable or animal remains yet undecided, which are especially plentiful about spring. When they are not present the water of the Red Sea is, in the deep parts, of an intense blue, whilst the layer of water above its sand-banks is of a green tint. Contrary to what is generally supposed, the water of the Red Sea is not remarkable for its saltness: the quantity of salt varies from 3·92 to 4·10 per cent.; and in winter the percentage of salt in the Mediterranean, at Marseilles, is 3·8, whilst that of the Red Sea is 3·6 only.

The evaporation which takes place from the surface of the Red Sea is yearly about nine yards and a half, whilst the rain brings back barely 1¼ inches, because, although it rains abundantly near its coasts, the water which falls is nearly all absorbed by the parched soil.

The result of this enormous evaporation is the descent to the bottom of the sea of a denser and more salt water, which, doubtless, when it has accumulated on a level with the natural barrier, situated near Moka, is carried away by a submarine current, whilst an inverse current of less briny water occurs at the surface and replaces the former. According to M. Babinet, the same phenomenon takes place at Gibraltar. The water of the Red Sea is thus renewed once a year. Within the strait between the 14° and 21° of latitude, which forms the centre of the great volcanic region, a portion of the waters of the Red Sea attain a very high temperature, descending rarely lower than × 26° (centigrade) even in winter: being in March and April at × 29°, and as high as × 32° in May.

The greatest heat in these regions occurs about September; the temperature of the air and that of the sea, at this period, is higher than that of the human body: and if, whilst it rains, you pass your head from under the tent upon deck, the sensation experienced is something similar to what would be produced by boiling water.

In November, 1856, an exceptional phenomenon occured: whilst the thermometer in the air marked + 27° 9 (centigrade), the temperature of the sea was, between the 17° and 23° latitude, as high as × 41°! This high temperature would be difficult to explain without having recourse to volcanic phenomena. In the Gulf of Suez, properly so called, the temperature is, generally speaking, moderate.

Some soundings taken by Captain Pullen, during the letting down of the submarine telegraph, show that in the Red Sea at 10° 59' latitude north, and 64° 27' east longitude, the depth was 1,880 fathoms; between Sumatra and the coast of Arabia, at a certain point, the depth is 1,200 fathoms, and at another point, 1,500.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

As there was nothing to detain us at Stchonn, we left it early the next morning with the intention of taking a direction which should bring us near the coast, as I had heard that there were several islands very near which contained active volcanoes. After about two hours' travelling, we came to a large building surrounded by numerous sheds. This was an earthenware manufactory, and, as I had never seen anything of the kind before, we requested permission to go over it, which was readily accorded. In the first room we entered were a number of men engaged in preparing and modelling vessels of different kinds; in the next, young women were painting them in different ways; the coarser kinds were finished very rapidly, but some of the finer were so elaborately done that the process was an exceedingly slow one. It is unnecessary that I should describe all the working processes, because, as I am entirely ignorant of the manner in which earthenware is manufactured in Europe, I cannot tell in what respect the two processes differ, and I might be only describing what is well known; moreover, it is certain that European manufacturers would learn nothing from the Japanese on this subject; for though they have some very fine china, they have none to equal what I have seen at home. Whilst looking at the young women who were so slowly applying the colouring matter required to constitute the representation of a dragon, or some other fabulous animal, it occurred to Dsetjuma that a photograph might be printed on a piece of porcelain as readily as on a glass plate. He mentioned his idea to me, and, as it did not seem impossible, I willingly undertook to try some experiments which might lead to such important results as would effect, as I thought, a revolution in ceramic decorations in Japan. The proprietor, as soon as the idea was explained to him, was all impatience to see the attempt made, though he could not possibly comprehend how it was to be done. I was almost as much at a loss myself; but I knew that something of the kind had been done in Paris, and though my recollection of the method was somewhat indistinct, I thought that a few experiments would be sufficient to show if the thing was feasible.

After the greater portion of four days had been spent in experiments, I succeeded in discovering a process of fixing the photograph on porcelain biscuit, and this with such exactness and perfection, that the half-tones were almost as delicately marked as on a print from a negative. The process by which I accomplished this was as follows. [The method described by our correspondent differs so little from one which we published a short time back, that it is unnecessary that we should occupy our space by giving it.]

I was greatly delighted with my success, and began to dream of fortune and honour, and I don't know what besides, which was to result from my discovery. The women seemed to take a special interest in the matter; but I could not help remarking that the expression of their countenances was not quite as amiable as when I was taking their portraits in groups, but I thought this might arise from my paying them so little attention. We were talking over the possible advantages of the discovery, as we sat smoking our pipes, when one of the bearers approached, in the humble manner usual with them, and, after asking his master's permission to

* Continued from vol. iii. p. 151.

speak, informed him that there was a plot on foot to destroy our apparatus that night, because they were afraid that it might take their business away from them. The man was closely questioned, with a view to ascertain whether the conspirators were few or many, and, according to his account, they included the whole of those employed in the establishment. Under these circumstances, it became necessary to consider and decide at once on what was to be done. I suggested that it would be sufficient to take the apparatus with us into the room where we slept, as they would not dare to force their way in there; but Dsetjuma, who of course knew his countrymen better than I, said that would probably lead to the loss of our own lives, as we should be certain to resist the destruction of our property, and they would not hesitate to knock us on the head, while under the influence of excitement. He ended by saying that he thought we had better depart at once, or the whole object of our journey might be defeated. He gave orders to the men to get the things into the palanquin without attracting attention, if possible, and to let him know when they were ready to start. This was soon done, and we were shortly on our way towards the mountains which lay between us and the coast. We had ridden seven or eight miles without seeing any houses, except a few scattered huts here and there, and were riding along a road shaded by the sun from the trees which bordered it, when, all of a sudden, it became almost dark, as if the sun had been eclipsed, as, indeed, it was, by a dense black cloud moving with immense rapidity. I had seen something before of the sudden storms to which one is exposed in this country, especially when travelling near or among the mountains, but I had never seen one which marked its approach by such threatening, I may almost say awful, appearances as this. The birds left off singing, and the horses pressed closely together, as if for mutual protection. There was hardly time to look round for the shelter which did not exist, for the trees were chiefly firs, of the kind which throw out short branches at regular intervals, and were, therefore, useless for such a purpose. The palanquin was thought of, but this would not hold more than one, being so filled up with apparatus. The only thing that could be done, therefore, was to put Dsetjuma inside, and for the rest of us to make up our minds to bear the storm in the best manner we could. I felt as if I was standing in a drying-kiln, the air was at first so hot and dry; then it became gradually loaded with vapour, and I had just time, by a sudden impulse, to slip off my dress, and thrust it into the palanquin, when we were literally bathed in the most intensely vivid light, the flashes of lightning following each other with such wonderful rapidity that the eye could scarcely recognise any intermission between them. Then came a burst of thunder so loud and long, that it seemed to crush me to the earth. Nobody, who has not heard so fearful a noise, can form an idea of the overpowering effect of sound on the nerves. The horses trembled in every limb, and were so weak that, when I laid my arms upon the back of that I rode, with the intention of mounting him, he literally sunk under the pressure. In a minute or two the rain came down, not in drops, but seemingly in a mass. It beat against my naked skin with a force like that I have experienced when I have thrown myself on the surface of water from a height, instead of plunging perpendicularly into it. The first sensation was delightful, but after it had lasted a few minutes I began to feel cold, and as the horses seemed to have recovered from their fright, under the influence of the water, I mounted, and told the bearers to take up the palanquin and push along to the nearest house, where I would wait for them, forgetting, in the stupefaction caused by the noise and the rush of rain, that I had stripped off my clothes to prevent them from getting wet. Having given them these directions, I rode off in search of this refuge, the rain all the time pouring down in such torrents that I could only open my eyes while I held my hand above them to shelter them. I urged the horse along as hard as he could gallop up the road, which became a rather steep ascent, and had just passed through a hollow, in which the water reached up to my feet, when I was compelled to pull up and turn round, for the rain streamed down my face in such a manner that I was unable to breathe. Raising my head, as soon as I had recovered my breath a little, I looked down the road, and could scarcely believe my eyes when I saw it was a deep, foaming torrent, the hollow across which I had ridden having the appearance of a mill-race. The possibility of Dsetjuma being swept away by that portion of the torrent which took its course down the road occurred to me in an instant, and I rode back to the hollow I had crossed with the intention of going to his assistance, but I found it impossible to get the animal to attempt to ford it. In this dilemma, with the lightning, thunder, and rain raging around me, I thought it was best to seek for a place of shelter, as I felt myself getting very cold, notwithstanding the excitement; so, turning my horse's head round, I rode away as hard as I could force him to go. The poor beast must have found it almost as hard to see as I did, and it is not surprising that when the road made a sudden curve he, instead of following the road, ran right into the low bank which bordered it with a crash that sent me rolling head over heels into a field, which was converted by the rain into a muddy fluid. I picked myself up as soon as I could, and, covered with mud from head to foot, I staggered back into the road. My horse was standing quite still, stupefied by the shock he had received; I mounted him again, and rode on at the same reckless pace, the rain very soon washing me clean. I think I must have ridden nearly an hour, when my horse suddenly stopped at a house by the roadside. This house turned out to be one of the miserable little inns which one only meets with in Japan, by the side of unfrequented roads. It was crammed with people, not only inside, but under the verandah they were packed as closely as possible. I jumped off my horse, and throwing the bridle over one of the hooks which they fix in the doorposts, and knowing now whereabouts to find the best room in these inns, I went right through the house and into the first apartment I could see empty. My entrance seemed to cause quite a sensation, for on looking round to shout for the landlord, I saw the passage was filled with wondering faces. When the landlord came, I sent him for some towels to dry myself with; but he, too, stared at me in such a stupid fashion that I felt annoyed, when it all at once flashed across my mind that it was the fairness of my skin that attracted such marked attention. It was not until this thought occurred to me that I remembered the danger I ran of being discovered to be a foreigner, and I determined that if Dsetjuma did not soon arrive I would go to meet him at any risk. From constant instruction, in the course of our journey I had made considerable additions to my knowledge of the Japanese language, and was now able to ask for anything I required, and even to converse slightly, but not sufficiently to sustain a conversation without its being seen that I was not a native of Japan, so I assumed a stern expression of countenance, like that of a man not willing to converse, or likely to encourage any person in addressing me. The landlord returned in a minute or two, bringing me a dress, followed by a woman with a tray covered with sweetmeats, and, what was really a good thing under the circumstances, a steaming cup of tea.

(*To be continued.*)

THE FOTHERGILL PROCESS.

To the Editor of "The Photographic News."

Sir,—I have been a subscriber to the "Photographic News" from its commencement, and have, in common with hundreds, received many valuable hints from its pages. You have made it a excellent guide and adviser to photographers, and supplied a want that was deeply felt, viz., an organ for the free interchange of opinions between those who practise the art.

My immediate object in writing to you, is to ask you to insert my name in your next list of the Stereoscopic Ex-

change Club, and as I know it is necessary to show some ground for asking this favour, I inclose four slides for your inspection, which I trust will be found satisfactory. The negatives were taken by the Fothergill process, which I have practised for some time with much success. I find it a real boon. For all kinds of still-life photography I consider it everything that can be desired, equalling the wet in all, and far superior to it in some, more especially in landscape work, where the view runs far into distance. Of this quality of rendering distant objects I give you slides, Nos. 1 and 2, as examples, where the horizon is distinctly seen (with the proper gradations of intervening objects from the foreground), in the one case three, and in the other seven miles distant. As to the certainty of the results of the Fothergill process, I find it so great, that a failure is a very rare exception indeed. I have exposed thirty plates (12 by 10), in succession, and never had a failure, and this when the plates have been prepared for months. In the month of July last I prepared a large number of that size, and have used them from time to time, as I required them. I have now but two left; the last of these I exposed a few days since, and the resulting negative was as free from stains and defects of any kind as could be desired; indeed, I have not failed in a single plate. During the same time I have prepared and used a large number of stereo. and other small plates, and not one in fifty has been a failure. Your correspondent "J. N.," in "News," No. 62, need not trouble himself with a tent, &c., to work the wet process. If he will only give the Fothergill a fair trial, he will find it capable of giving the details of trees, &c., equal to any process known. The great mistake, in working this and all other dry processes, is in not giving sufficient exposure. As a proof of what can be done in foliage, I refer you to slide No. 3.

Before concluding this letter, permit me to say a word in reference to the article by "M. N. P. S." which appeared in No. 58 of the "News." The tone of this writer is, at best, somewhat opinionated, and this, although it adds much to the raciness of his writing, detracts somewhat from its usefulness. His great onslaught is against what he calls the "four-drachm advocates," whom he considers the great stumbling-blocks in the way of the successful practice of the process. Now, sir, to show how the results of practical men may differ, I state, that I never could work the Fothergill process successfully until I adopted the very system he so rashly condemns.

I commenced practising the process with washing the plate (after sensitising) in a well-bath for half a minute, changing the water every plate, and the dozen stereo. plates so treated turned out well, so I thought I had hit upon the right method; the next batch of plates was prepared in the same manner, but although the manipulation was exactly the same, every plate was a failure. The fact is, that the collodion used for the first plates was all gone, and I was obliged to use another kind; hence, the unfortunate result. The defects in the fully-washed plates were want of intensity and clearness, and, indeed, of every quality that should distinguish a good negative. I next tried the same collodion with less washing, and some of the plates were good, but generally they were not to be depended upon, one-half at least being bad. After this I tried Keene's collodion, though still adhering to my old prejudice in favour of washing in a bath with plenty of water, but I succeeded no better than I had done before, having, at least, three failures out of every five, and even those which I considered successful then, I now look upon with something like disgust. I then did what I ought to have done before, I adopted Keene's formula of manipulation, with his collodion, and ever since I have invariably met with success.

The great defect of "M. N. P. S." is that he generalises too much. He never calculates upon the kind of collodion having anything to do with the amount of washing required, and yet a little consideration must convince any one that a collodion which gives great intensity must require more washing than one of much slighter structure. I therefore think he does wrong to sneer at the advocates of a fixed quantity of water being used, according to the kind of collodion employed.

Surely, when it is known that the number of grains of iodide in the collodion, of silver in the bath, or acid in the developer, have so much influence in producing the required results, there is nothing worthy of contempt in considering it necessary to regulate the quantity of free nitrate to be removed from the surface of a Fothergill plate, in order to ensure success. I, for one, must still remain an advocate for the four-drachm proportion, believing it to be correct in theory, and knowing it to be productive of the most certain results in practice, and in this belief consider it my duty to warn all those who may wish to commence the practice of the Fothergill process, to beware of following the dictates of "M. N. P. S.," for, if they do, the results will only tend to disappoint and disgust. I would advise all such to purchase the collodion of some maker who has studied the process, and to follow implicitly the directions he gives, until their own experience may justify them in making any alteration practice may suggest. I give this advice as one who is no novice in the practice of most of the branches of photography, and who has worked his way to the knowledge he possesses by hard work and unflinching perseverance, and whose knowledge of the difficulties he has himself encountered, makes him desirous of warning the inexperienced against the assumptions of a writer that are formed on most imperfect premises, and would, if followed, be productive of much disappointment.—I am, &c.,

W. H. Jennings.

Proceedings of Societies.

London Photographic Society.

The second meeting since the vacation of the above society was held at the rooms in Coventry-street on Tuesday last, which was attended by a good number of members.

As neither the President nor Vice-president was present, Mr. White was requested to take the chair, which he did with some reluctance.

After the Secretary had read the minutes of the last meeting, the President, after moving the confirmation of the minutes, called upon Mr. Ennel to read his paper.

Mr. Ennel replied—in the words of the immortal carbon printer of Dorchester—that he could not read a paper, for the simple reason that he had not written one. He related a facetious anecdote to prove the wisdom of not doing so, which may have been very interesting to those who sat immediately in front of him, but which was, unfortunately, inaudible beyond that distance; he thought, however, that if he happened to digress from the subject occasionally, there would always be some salient point to bring him back to it. He began by referring to the difficulties in the way of cleaning the glass plate, and describing how they were to be overcome. Water was of no use for this purpose, and acid was very little better; he found that a mixture of tripoli powder and water rubbed on the glass with a piece of chamois leather, and, when dry, rubbed off with linen rag, was the most efficient method. He next showed the board on which he cleans his glasses. This was a square board with a narrow strip cut out of it diagonally, in which a bit of metal worked backwards and forwards which could be made tight to the board by means of a screw, one of the corners of the plate passing under this piece of metal; the board being hollowed out to the thickness of the glass this sunk in, so that it was level with the edges of the board, and, consequently, two of its sides rested against it. It is difficult to explain in words the manner in which the glass is secured, but it will readily be understood by anybody who will take the trouble to lay a plate on a board like that described. He next proceeded to give members a lesson in coating plates with collodion, which it is not necessary we should repeat. He was then led, by the act of dropping the plate into the bath, to moralise on dippers. He said, a great deal had been said on the subject of dippers in some of the papers, but he found that there was nothing like the glass dipper. The silver dipper was apt to bend with

the weight of a large plate, whereas the glass would not do so; moreover, the latter had another advantage over the former; in removing the plate from it, the back might be drawn along the edge of the glass dipper; and it was astonishing what a quantity of bath solution is saved in this way. He then assumed that the plate which had been lowered into the bath was sensitised; and, taking it out, he put it in the frame, and placed it in the camera. This frame was of rather peculiar construction; instead of a slide being raised, in order to expose the plate, two handles, fixed on the top, were turned, one of which removed a fastening, and the other opened a hinged door, which folded back against the inside of the camera. In removing a plate from the frame, he never touched it with his fingers, but used a clip for the purpose, which could be made in different ways, some merely taking hold of the corner, and others taking hold of the corner, and, at the same time, giving a support to the plate; the latter being necessary in manipulating large plates. He next exhibited a developing stand, made of three wires soldered to a piece of lead pipe, the tops being brought almost close together, the interval between them being filled by the top of a glass pedestal, on which the stand rested as on a pivot. He remarked on the complaint which many people made, that they frequently broke negatives in the printing frame; now, he had never broken a negative, and for the simple reason, that he did not use a printing frame; that which he used in printing was a hinged board, hollowed on one side and padded; the sensitised paper was laid on this, and then the negative on the paper, the negative being retained in close contact with the paper, by means of six metal tongues on each side, which worked round a screw in the edge of the frame, and, when brought over the plate, of course kept it immovable. When it was desired to inspect the progress of the printing, this could be done with great facility; it was only necessary to push back three of the tongues on each side, and half the board fell back and left the paper on that side exposed. The advantages which this board possessed over the ordinary printing frame were considerable: it was much lighter, more portable, and could be made of any size; a small one for printing from stereoscopic plates could be folded up and put into the waistcoat pocket. He again showed the utility of clips by removing, by means of one, a sheet of paper from the sensitising solution; the clip being placed on a shelf, the paper remained suspended from it, to drain and dry. He observed that it was a common practice with photographers to tear off a bit of blotting paper and stick it on the corner of the sensitised sheet to drip, quite regardless of the shape of this bit of blotting paper. Now, the more acute the angle the quicker the drop fell from it; consequently, the piece of blotting paper should be tongue-shaped, and not more than a quarter of an inch wide at its widest part. The next consideration was the washing dish. The great desideratum in washing prints was to keep up a running stream of water, continually changing; to accomplish this he took a common glazed earthenware dish, and, having removed the glaze, he drilled a hole through the side, about two inches from the bottom. Into this hole he introduced the end of a gutta-percha tube, and fixed it there. The end of a syphon tube was brought into the dish, and a supply of water drawn over, by it, from a cistern, which might be a pail, or anything else capable of holding water. It was clear that by this arrangement there was no trouble in washing prints, because, as soon as the water had risen to the level of the mouth of the gutta-percha tube in the side of the dish, it would be carried off, while there would be a constant change of water. A glass syphon tube could also be used for emptying the bath when it required filtering, the flow of the solution into the filter being regulated by the rapidity with which it passed through; which could be easily done by converting two portions of the tube together by means of a short piece of india-rubber tubing, the sides of which could be brought as nearly into contact as was desired, by means of a small wooden clip constructed on the principle of the blacksmith's wire. To test the strength of the silver bath, he used a small glass syringe to draw out a small quantity, which he subsequently precipitated by a standard solution of salt. He next dwelt on the advantage of suspending bodies it was required to dissolve near the surface of the liquid instead of dropping them into it, and having the trouble of frequently stirring the solution in order to accelerate their dissolution, which was the common practice in all laboratories. To illustrate his meaning he put a small quantity of nitrate of copper into a test tube, and added water through a funnel to which a bent tube was attached; the water which rested on the nitrate became saturated, while the superincumbent strata of water remained clear, owing to its being of less specific gravity than that which was saturated with nitrate. To show what a different result was produced when the nitrate was suspended near the surface, he tied up a small quantity in a bag, and suspended it near the top of the tube, but he failed to give optical demonstration of what he desired to prove, from the bag accidentally falling to the bottom. He suggested this method for dissolving gum arabic, as being infinitely the best. It was also available for making collodion, and offered important advantages over the plan in common use. Instead of immersing the pyroxiline in alcohol, &c., he tied it up in a piece of Irish linen, and suspended it in the liquid, a little below the level of the surface; this dissolved in the course of a few minutes, and the collodion might be used the same day, whereas, in the way in which it was ordinarily made, it had to be kept for three or four weeks before it could be used. The residuum which remained in the linen contained the indissoluble portions and the impurities, and might be emptied into a bottle and kept for the purpose of stopping up holes, which the photographer might chance to make, in his hands. Having filled a large glass jar with water, he showed how a syphon might be used to draw off the supernatant liquid, without drawing off any of the precipitate which was supposed to be falling to the bottom. The syphon was formed of several glass tubes, connected by means of India-rubber tubing, to render it flexible; the lowest joint, which was curved upwards, projecting from a hollow India-rubber ball, which, of course, floated on the surface. By this method the surface water was constantly drawn off at a rate which could be regulated by means of the same compressing clip already described. To prevent the ball and tube from eventually sinking down among the precipitate, a glass pin was thrust downwards through the tube, which, by resting on the bottom of the vessel, prevented the tube from falling any lower. He then pointed out how nitrate of silver stains might be removed from linen. He simply wetted the stain with chloride of lime water, and, after allowing it to remain on a little while, he washed the linen in a solution of hyposulphite of soda, and, finally, in water. For his own part, he disliked these stains very much, and though some photographers might like to have photography at their fingers' ends, as it were, he preferred to use methods by which he could escape them; hence he made it a rule not to touch anything with his fingers, and, for this reason, always used the different clips he had shown in photographic manipulations. He concluded by thanking the meeting for the patience with which they had heard him.

The President then said that M. Joubert was present with some prints by his new process, and called upon him to produce them, which he did accordingly; but as he declined to give any description of the process by which they were printed, it would be premature for us to pronounce an opinion on their merits.

As no gentleman offered to make any remarks on Mr. Ennel's lecture, the President pronounced the meeting at an end.

The French Photographic Society.

At the meeting of this Society several proofs obtained by Salmon and Garnier's carbon process were presented by Count Schonwaloff; also a number of views taken at Lima by M. Colpaert; and a series of proofs, taken by M. Garnier, of Guernsey, by artificial light, produced by the combustion of different inflammable powders yielding a light more or less white.

M. de la Blanchere sent his recently published book, "L'Art du Photographe," together with a letter, asking that it might be submitted to the judgment of a committee, who should be appointed for the purpose of giving an account of it. This modest demand was refused by the President, on the ground of its not being the custom of the Society to give an official report on printed books; but it might be reviewed by some members of the Society, and the review published in the *Bulletin*, if it were approved by the editing committee. M. Chevalier also presented a copy of his work.

M. Cordier addressed a letter to the Society calling at-

tention to the following fact:—"A glass, coated with collodion, iodo-bromised by cadmium, and sensitised in a rather old silver bath, highly charged with ether and alcohol, was exposed for forty-five seconds in a medium light. While it was being sensitised, the door of the laboratory was opened and instantaneously shut again. On development, this proof became a vigorous positive by transparency. Several members attributed the occurrence to the action of light during the instant that the door was open.

M. Chevalier read a paper on the subject of an apparatus for printing life-size portraits, and called the attention of the Society to the fact that, so long ago as 1854, he had, in a book on photography, described an instrument by means of which portraits of the smallest size, even if they were microscopic, might be enlarged to any extent, aud the same with respect to engravings or maps.

A letter was read from M. Poitevin, thanking the Society for the gold medal awarded to him for his discoveries in carbon printing.

M. Schonwaloff addressed a letter to the Society on the subject of a process, by means of which he can, at his option, obtain a picture which is at the same time a negative and a positive, if viewed by transmitted light.

M. Jamin presented an apparatus for enlarging proofs. He said that, five years ago, he had made an apparatus, composed—1st, of a bi-convex, or plano-convex lens—it did not matter which—the object of which was to direct a luminous ray through the negative; 2ndly, of a mirror, inclined mechanically in such a way that the luminous ray was always thrown upon the centre of the lens; 3rdly, of a combination of achromatic object-glasses, intended to throw the image on a screen, which was moved backwards or forwards, according to the size he required the picture to be. The arrangement of the object-glasses was not important, and any would do, provided the focal length was double the size of the negative. The shorter the focal distance of the glass, the larger the picture at a short distance, the more vivid the light, and, consequently, the more rapid the printing. He had not patented his invention, because its fundamental principles had been previously described; nevertheless, he had described it to a great many persons. It was rather difficult to manage the apparatus, and the time of exposure required, with strong sunlight, was about an hour.

M. Thompson, *apropos* of these remarks and M. Chevalier's letter, said that M. Woodward's apparatus, to which these opticians had covertly alluded, was constructed on entirely new principles, which was very clearly demonstrated by a comparison of the results obtained by its means with those obtained by any method of enlargement previously known. He added to this statement several explanations on the construction of M. Woodwood's apparatus; but as he undertook to present the apparatus itself at the next meetiug, the explanations he would then give would be more precise and complete, and would establish, in an incontrovertible manuer, the essential difference which exists between this apparatus and any other.

M. Bertsch said, that in point of fact the principle of Woodward's apparatus appeared to be identical with that of the illuminations by the magic lantern.

M. l'Abbé Moigno, in reply, said that the application of the principle in Woodward's apparatus was so entirely different that it might almost be said to be based on quite a contrary principle. The old system acts with diverging rays, and that of M. Woodward with converging rays, and it would be easy to show how much this concentration of rays remedied the drawbacks of all methods of enlargement tried hitherto.

The President suggested to M. Thompson that the most simple way of deciding the question would be to publish a geometrical drawing in the *Bulletin*, which would establish in a positive manner the similarity or difference between the respective apparatuses.

M. Thompson adopted the suggestion.

M. Frank insisted on the necessity of proofs being presented. He fully appreciated the value of a geometrical definition, but artists would attach more importance to visible results. A great deal had been said about prints obtained by Count Aguado with this apparatus, which would seem to open quite a new career for photography, and he thought it was a matter of sufficient importance to justify the Society in the adoption of every means of arriving at a correct result.

At the request of the President, Count Aguado undertook to present the prints referred to, at the next meeting of the Society.

M. Jouet communicated a dry collodion process which he had employed with great success. (This will be described in an article on modifications of dry processes, which will be published in an early number.)

The Duke de Luynes presented a large nuuber of proofs printed by the following process:—

1. Equal volumes of nitrate of uranium and perchloride of gold are poured over a positive paper, which is then dried before the fire. This sheet is placed behind a negative image, exposed, and watched until the image makes its appearance. The proof is then taken away, and washed many times with water, to dissolve out the soluble salts. The positive which remains offers various tints, according to the paper employed, and contains both gold and uranium.

2. The same operation is repeated with perchloride of iron, substituted for the nitrate of uranium. The positive obtained is washed with weak hydrochloric acid, to dissolve out all the iron, and afterwards with water. These positives contain gold only. In the first process, washing with hydrochloric acid would dissolve out the salt of uranium, which contributes with the gold to form the image.

3. A mixture of perchloride of iron and bichloride of platinum is placed upon the positive paper. The latter, being placed under a negative, is exposed to the sun. Even after two or three hours of exposure the positive is seen white upon a yellow ground; a reduction has taken place, and, to render it sensible, the paper is passed through a solution of chloride of gold. The image then immediately makes its appearance in black, and is formed of gold and platinum.

After this communication, Mr. Bingham remarked that the use of perchloride of iron and chloride of gold had been long since proposed by Sir John Herschel, who had based upon their action his *chrysotype* process, which was abandoned solely on account of the expense of the gold salt.

The President replied, that notwithstanding the labours of Sir J. Herschel, the communication made by the Duke de Luynes was highly interesting, as his researches were undertaken for a new and special purpose, that of producing permanent proofs, and from this point of view the method described appeared capable of yielding highly advantageous results.

M. E. Becquerel read a description of a mode of obtaining positives in the camera, due to M. Poitevin.

M. Jamin showed a modified stereoscopic camera he had constructed, which he has named a *Jaminoscope*. It consists of two distinct cameras, working by means of grooves, &c., on a single stand. The sides, which approximate to each other, are made of metal plates, in order to get the greatest amount of strength with the least thickness. The cameras can be united or divided to an extent which is only limited by the length of the board to which they are attached, which is also furnished with two circular *axes*, by means of which any angle can be given to them, and which would, if necessary, allow of their being turned in opposite directions.—*Condensed from the Bulletin of the French Photographic Society.*

Photographic Notes and Queries.

TRANSFERRING POSITIVES TO PAPER.

Sir,—Take of asphaltum, ½oz.; of pure oil of turpentine, 1½oz. Mix, and dissolve with gentle heat, aud label solution No. 1.

Take of shellac, 1 drm.; rectified wood naphtha, 1oz., and a few drops of alcohol. Mix, and dissolve with the aid of gentle heat, and label solution No. 2.

Take of gum arabic in crystals, 2 drms., 1 ditto of honey, distilled water, 1 oz. Mix, and shake occasionally till dissolved, and label solution No. 3.

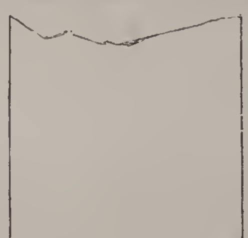
Having carefully made the three solutions, take a positive picture on glass, dry (either with or without varnish), pour over solution No. 1, tilting to and fro in the usual manner, so as to cover the entire plate, and when dry and hard, pour over solution No. 2 in the same manner. When sufficiently dry (which may be known by the dampness that may be felt on the plate, and the very minute globules on unevaporated

matter), apply solution No. 3 with a camel-hair brush, taking care to paste well and evenly the edge and corners of the plate. Place over this a piece of paper any size larger than the plate (Canson's positive paper is the best), and having laid some blotting paper on the glass, under and above, roll the glass well with a ruler, or any other round body, so as to facilitate the detracting of the film. When the rolling process has been continued for some time, gently turn and draw the picture from the glass, holding the corner of the glass in one hand, and the corner of the paper in the other, thus *gently* continuing the drawing, and when loosened at the corners, it will be found that the film will all peel off attached to the paper. It is generally necessary to cause a gentle stream of water to flow between the film and the plate, to facilitate the peeling process.

Nothing now remains but to hang the picture by one of the corners to dry. J. Drake.

IMPROVED DIPPER.

Sir,—As the form of dippers appears to have occupied some attention lately, allow me to describe the one we have adopted, and which combines the advantages of some of the most complex, with the simplicity of the old form. It is as follows:—Instead of the bit of straight glass fastened across the end of a long blade of glass, we cut two bits of a tapering form, and each not quite long enough to reach half way across the blade. The inner surfaces of these, and the lower end of the blade, are slightly roughened, and then cemented together, so as to leave a quarter of an inch or more between the points, for the bath solution to drain away (*see fig.*);



and as the plate only rests on two points, any drops adhering to the joint can never cause stains.

The same principle might be easily applied to old dippers, and to the gutta percha ones now in use.

538, *New Oxford Street, W.C.* J. Walter.

STEREOSCOPES OF LONG FOCUS.

Sir,—It would much oblige your readers if further particulars could be obtained of the long-focus stereoscope used by Professor Wheatstone. What is the largest size of picture that could be adapted to it? It would be necessary, for the sake of uniformity and convenience, that the lenses used should be of a given focal length, and the question is, what focal length is the most advisable to adopt? Mr. Bell's lenses are 18 inches. You seem to think 12 inches a good average. Again, is it essential that the lenses should be achromatic? With the present form of lenticular stereoscope they are not necessary, and I find the best effect produced by common double convex glasses. As to the size of each picture in the stereoscopic slide, I am inclined to think that it should be 4 inches square, or 5 inches square, at most—the square form being preferable for pictures to be viewed in this way. I presume the slides now in use could be also used with this improved description of stereoscope, which seems destined to elevate the stereoscopic slide from its present unsatisfactory position, and to assign to it a permanent and recognised place in the domain of Art. It will also be well worth consideration whether it would not be advisable to adopt such a size of picture as would be equally adapted to the reflecting stereoscope. In that case, pictures of at least 5 inches square would be desirable.

A Subscriber.

QUERIES ON COLLODION.

Sir,—As an amateur in photography, I am puzzled to know what is the defect and what the remedy for a sample of collodion I have. It was sold me for *positive*, and is of a dark amber colour, flows freely, but yields a film as much like ground glass as possible, and the picture, when taken, developed and fixed as described in your paper, disappears as the plate dries, but can be plainly seen on again damping the plate. Will any of your correspondents kindly assist me to remedy it? I do not feel inclined to throw what I have away, if it can be made available by any means. W.

GUTTA-PERCHA BATHS.

Sir,—It seems nearly settled that gutta-percha baths are injurious to silver solutions. Can any one say whether it is as well established, *that, when coated with shellac varnish, they are harmless?* I should prefer gutta-percha baths to any other, if they could thus be rendered totally innocuous.

A friend of mine is now trying a porcelain bath. I do not like it, as I frequently find a black deposit all over it—especially over the dipper.

Pemb. Coll. H.

TO CORRESPONDENTS.

Photo.-Litho.—1. The negative should be placed, face downwards, on the starched side of the paper. 2. Lithographic printing-ink is, we imagine, the kind recommended. We have examined the specimen inclosed with great interest, and are of opinion that it is a genuine photo-lithograph. It is most interesting; and we should much like a full description of the process, if you can obtain it from your friend.

D. Wright.—We will get as much information as we can on the subject of stereoscopes of long focus, and communicate it to our readers. The address of the publishers was on the catalogue—Negretti, Hatton Garden. We think 5 × 8 would be the best size for the double picture. Of course the glass must be rather larger, to allow of imperfections at the edge.

A. Y.—1. Your bath is of course spoilt. You must add sulphide of potassium, or of ammonium, to it, until a black precipitate ceases to be produced, and then treat this sulphide of silver in the way recommended by Mr. Spiller, in a recent number of the "Photographic News." 2. It was an error of the printer.

T. Clark.—The term water-markings is usually applied to an appearance on the developed negative similar to watered silk. They are produced in a variety of ways, and differ slightly in appearance, according to the cause which originates them.

H. N. King.—We have given the sample of varnish which you sent a fair trial, and find it very good for the purpose of varnishing negatives. It dries hard, and has no tendency either to scratch or stick to the positive paper.

Excelsior.—The price of each volume of the "Photographic News," bound in cloth, is 8s. 6d. You will find a very excellent receipt for what you want, by consulting the index of our second volume.

Herman.—1. It would not be safe to trust to obtaining good photographic chemicals at Singapore. You should take the necessary materials out with you. 2. Aplanatic. 3. Yes.

Ω.—You must use the one-inch object-glass, remove the eye-piece, and illuminate either with sunlight or powerful artificial light, condensed upon the object.

E. A. H.—If there is no iron in the water (known by its depositing a brown sediment on standing), it will answer well for photographic purposes.

C. C. W.—Expose the brown salt to a slight increase of temperature in the air; it will then be fit for iodising collodion with.

Photo. Beyond Railways.—Received. B. M. A.'s request shall be attended to. We shall be very pleased to hear further from this correspondent.

A.—M'Tear.—The manuscript has been mislaid. As soon as it is found it shall be returned, as requested.

Fotograf.—See the first number of our current volume. A specimen must be forwarded.

Y. O. U.—We cannot undertake to answer such questions.

J. H. L.—No. 1 is considered the best.

P. R. and H. R. R.—Received.

Communications declined with thanks.—Pelops.—O. U. S.—P. N. G. O.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—A. R.—Amantis.—Apparatus.

In Type:—M. Van Monckhoven.—A. Watt.—G. M. Ferri.—Oxoniensis.—An Admirer of the "Photo. News."—H. M.—N. Otway.—J. E. A.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

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NEW METHODS FOR PREPARING PHOTOGRAPHIC PYROXYLINE.

BY M. VAN MONKHOVEN.

We have previously shown, by well-established theories and by specific experiments, that, in order to obtain gun-cotton, which is not only soluble in alcoholised ether, but will also produce a fine adhesive coating upon the glass, that there should not, in our opinion, be any excess of sulphuric acid, whilst the temperature should bo neither too high nor too low. It is upon these principles that we base the following method, in which we use a mixture of nitric and sulphuric acids like M. Meynier, but modified after the manner of the preceding process by M. La Porte. Let us proceed, in the first place, to consider the various substances used in this preparation :—

Nitric Acid.—The nitric acid of commerce is a colourless liquid, which stains the skin yellow, and has a peculiar odour. The acid of commerce is frequently very pure, and the impurities commonly found therein in no way affect the success of our process—a very important consideration. Only, when this acid is purchased, it frequently contains foreign substances, which may be seen floating therein. When this is the case, the liquid should be allowed to settle, and the clear portion should be decanted off into a retort, and then allowed to boil until it reaches 123° centigrade. For this purpose, the retort, placed upon a metallic plate, which moderates the fire and prevents the bursting of the retort, is submitted to the action of heat, proceeding either from a portable furnace, or a strong spirit lamp, or finally, from a gas jet provided with an air burner.*

From time to time a mercurial thermometer,† graduated on the stem, is plunged into the liquid, and when the latter has reached 123°, the action of the fire is arrested by removing the retort and allowing it to cool slowly. When the retort has been, at the commencement of the operation, completely filled with acid, in order that it may attain to 122° or 123° of temperature, more than half the liquid should be allowed to evaporate. By this method, a certain quantity of acid carried off in a state of vapour is lost, but a refrigeratory apparatus can always be adopted, which will condense these vapours. This can be easily done by those accustomed to chemical manipulations. Those, however, who are in search of simplicity in photographic operations, must do as we have said, namely, lose a small quantity of acid, which, considering the low price of this substance, will be but an insignificant loss. The object of this operation is to show that nitric acid of commerce is not very concentrated, its ordinary density rarely rises to more than from 1·33 or 1·37, especially as one is liable to purchase acid, to which water has been fradulently added. If, then, the nitric acid be boiled, the boiling point constantly rises, because the water passes off in a state of steam, while scarcely any of the acid is distilled; but at 123°, the acid, which has become concentrated, will, in its turn, become volatile, for which reason the operation must be suspended. The remaining acid will then be of a density of 1·42, and will be of the formula $NO_5, 4HO$.

* In all laboratories gas is now in use with Bunsen's burners. The flame produced by these burners is blue; the carbon of the gas being entirely consumed by mixing with the air formed in the tube. These burners only cost from five to ten francs, according to size, and admit of glass being bent, of capsules, and of retorts being heated with cleanliness and economy.

† A thermometer with the mercury graduated from — 20 to + 160° is indispensable to every photographer.

Sulphuric Acid.—The concentrated sulphuric acid of commerce, as it exists everywhere (at 66°), is perfect for our purpose.

Cotton.—The best cotton is that which has been corded. It can be had cheaply enough in the shops. It suffices that it should be cleansed from all mechanical impurities which it may contain. Cotton used for cleaning daguerrier plates is excellent for this purpose.

The following is the mode of preparing gun-cotton with the before-mentioned acids. Into a glass vessel graduated with cubic centimetres, pour fifty centimetres of nitric acid of 1·4 density, prepared as already described. The acid thus measured is then poured into a glass vessel; one hundred centimetres of sulphuric acid should then be measured off and poured into the same vessel. As the mixture of these two acids will become heated, and the glass may probably be broken, the vase should be placed inside a porcelain one; for instance, a porcelain jar supported by a wooden ring, or one of the porcelain basins used in photographic operations. If the glass in breaking allows the acid to escape, it will still be preserved in the porcelain vessel.

A thermometer being dipped in the two acids when mixed will rise to about 70° or 80°. Then stir the mixture with a tolerably thick glass rod, and then allow it to cool till the thermometer indicates no more than 60° centigrade. Then dip, in small portions of half a gramme at a time, about seven grammes of corded cotton wool. Each time that a fragment of cotton is dipped in the liquid, it should be pressed with a glass rod, in order to dispel the air, and allow the cotton to be well soaked. When the whole is dipped, the glass rod and the thermometer are withdrawn, and the vessel is covered with a piece of glass for ten minutes. At the end of this time, the acid is transferred into another glass vessel, the excess of liquid being squeezed out by pressing the cotton with the glass rod. This liquid may be used a second time for three grammes of cotton, adding thereto ten cubic centimetres of sulphuric acid. The cotton is then washed as described in M. Gandin's process. The following is a repetition of the formula :—

Nitric acid, sp. gr. = 1·4 ...	50 cubic centimetres.
Sulphuric acid, sp. gr. = 1·8	100 ,,
Cotton	7 grammes.

Immersion for ten minutes at 60 degrees centigrade; and having used this once, add the following mixture :—

Sulphuric acid	10 cubic centimetres.
Cotton	7 grammes.

To be immersed for ten minutes. This operation should be rapidly performed without loss of time, as the liquid should not be allowed to cool below fifty degrees. The cotton thus obtained is completely soluble in alcoholised ether, and spreads easily upon the glass; its colour is of a yellowish-white, especially if washed in an ammoniacal water.

Mr. Hardwich, in his treatise on Photographic Chemistry, entirely agrees with us as to the importance of a good preparation of gun-cotton; like us, he insists on the necessity of a proper degree of temperature, but he differs with us in the following formula prescribed by him :—

Nitric acid, sp. gr. = 1·45	170 grammes.
Sulphuric acid, sp. gr. = 1·85 ...	180 ,,
Water	130 ,,
Cotton	15 ,,

I would ask this author his object in preparing expressly a nitric acid of 1·45 of density, to be afterwards mixed with

two-thirds of its weight of water, which reduces it to the state of ordinary acid. This preparation of acid at 1·45 should be applied to every piece; this, indeed, is neither tedious nor difficult, but a mere photographer might not, however, be able to execute it. We have carefully experimented on the preceding formula, but must say, that while scrupulously following the directions given by this author in his excellent work, we have always found our cotton to dissolve in the liquid.

It is quite certain that the mixture of monohydrated nitric acid (sp. gr. = 1·51) and of sulphuric acid, produces a very explosive and not easily soluble gun-cotton; but by adding thereto twenty-five or thirty per cent. of water, a perfect result is obtained. Now, this is precisely the aim we have achieved in using the acid of commerce, which we bring by evaporation to the boiling point of 123 degrees, and, consequently, to a sp. gr. of 1·4. In this case, this acid differs from the monohydrated acid by twenty-five per cent. of water. The formula of M. La Porte, is, as regards its chemical composition, precisely the same as our own. We do not understand, however, why this author substitutes nitrate of soda, which is not to be met with in retail trade, for saltpetre, which is everywhere to be had in a state of great purity.

We here conclude this notice of gun-cotton. In order to write it, we have collected all the investigations of which this substance has been the object, and of which the preceding has been a faithful *resumé*. With regard to the method of preparation just described, it is our own, having been led to its discovery by theoretical calculations, as well as by numerous experiments.

PHOTOGRAPHY ON WOOD.

The following is the specification of a patent recently granted to Mr. W. Spence, for improvements in the process of taking photographic pictures on wood. This invention consists in a process of preparing the block, and applying the silver solution thereto, by which an unchangeable picture may be produced directly upon the surface of the wood without injury to its fibre.

One method of applying the invention may be described as follows:—Take the white of an egg, mix it with about one-half of its volume of water, and beat the whole into a white froth; then, with a brush, or with a piece of soft-napped fabric, carefully moisten the face of the block with this fluid, and allow it to sink in and dry by natural evaporation. The surface of the block is then ready for the application of solution No. 2, which is made by dissolving about thirty grains of Russian isinglass and two grains of chloride of sodium in one ounce of warm water. When the solution is complete, and while yet warm, it is rubbed over the face of the block, as described with reference to the first solution, and allowed to sink in and dry. A dry heat is then applied to the block, sufficient to coagulate the albumen which underlies the gelatine within the pores of the wood. Another coat of gelatine solution may then be applied, which generally presents a glazed appearance, in some places indicating that the pores of the wood are filled to its surface. Any excess of gelatine which appears on the surface is removed by scraping with a knife or otherwise, and the block is then ready for the silver solution, with the exception that sufficient friction is employed to remove any film of gelatine which may cover the wood, and so bring the silver solution into direct contact with the surface of the wood itself. The printing is then performed precisely as on paper, except that the picture is made much darker than it is intended that it should remain. The solvent, or fixing and toning solution, is then applied in a heated state, which not only produces the ordinary effects as in photographs on paper, but also, by its heat, dissolves and removes the gelatine, and thereby frees the pores of the wood from everything but the coagulated albumen, and effaces all parts of the picture, except such as were taken directly upon the surface of the wood. It is therefore needful, as before stated, that the picture should be originally printed so deeply as to obliterate or conceal a large part of its forms, which reappear on the removal of the gelatine.

The combined use of the albumen and gelatine, when thus applied, has the following advantages:—The albumen is first applied, in order to form, when coagulated by direct heat, an insoluble base within the pores of the wood; the gelatine is then applied in such quantity as to fill the pores without spreading over the surface of the wood; and from its not being readily soluble in cold water, it allows the silver solution to become incorporated with the substance of the wood, but prevents its undue penetration. After the printing is completed, the warm "fixing" solution removes the gelatinous matter which would otherwise cause inconvenience in engraving and stereotyping, and leaves the wood in its natural state, as required; the coagulated albumen, being free from any viscid property, causes no inconvenience to the engraver or stereotyper.

The picture produced by this process is not liable to injury by friction, and admits of the surface of the block being sponged or washed, if found necessary. Either the albumen or the gelatine may be used alone with considerable success, but the best results have been found to be produced by their combined use, as above described.

The process may be successfully applied in the following manner, to blocks which have been previously pumiced and whitened, as if intended to receive a drawing:—Beat up the albumen of an egg with an equal volume of water, in which about ten grains of common salt have been dissolved, and this mixture, after stirring, will be ready for use. The whitened block is now laid in a horizontal position, and enough of the fluid applied to moisten its whole surface; the albumen will sink into the pores, and dry by natural evaporation, and it is then coagulated by heat, as before explained. This process may be repeated (without injury to the white surface) until the pores are filled, coagulating, and afterwards allowing the blocks to cool, each time. The surface is then ready for the nitrate of silver solution, which, when applied, comes into actual contact with the surface of the wood, but without penetrating to any injurious extent. The picture is then taken on substantially the same principle as a photograph on paper.

This process has the following characteristics, and obviates the difficulties, which have been experienced in the application of photography to wood engraving:—

1. The picture does not change by exposure to light.
2. The fibre of the wood is not injured as it is by many bases which have been employed to prevent the penetration of the silver solution.
3. The picture is not liable to be defaced previous to, or during the act of, engraving, as is the case when the silver solution is applied directly in the form of a chloride, or when it is prevented from coming into contact with the surface of the wood by the application or intervention of a film of collodion or other matter.
4. No viscid substance is left in the wood to cause inconvenience to the engraver, or adhere to the mould in stereotyping.

Having thus described the nature of the said invention, and in what manner the same is to be performed, I would have it understood that what I claim of the invention communicated to me, as aforesaid, is the application of the albumen, in such a manner as to form an insoluble base within the pores of the wood, and the taking of photographic pictures on wood, the pores of which have been filled with gelatinous matter; and subsequently removing the gelatine from the block without injury to the picture, by the application of a warm solvent, thereby preventing the undue penetration of the sensitive solution, while the photographic image or picture is taken directly on the surface of the wood itself.

LUMINOSITY OF THE SOLAR DISC.

The subject of light being one of the deepest interest to photographers, all researches which are calculated to lead to a discovery of its nature will be read by them with interest. We cannot imagine the possible consequences of such a discovery as regards photography. It might lead to such a modification of the present process as would greatly simplify it, and even to the obtaining of what has been so long desired—a picture in natural colours; a discovery which we certainly believe would be new, M. Tiphaigne de la Roche's assertion to the contrary notwithstanding.

For some time past French *savants* have been discussing the question, whether the sun is more luminous in the centre than near the borders, and one of them, M. de Chacornac, has addressed a letter to the French Academy on the subject, in which he says, that the interest taken in this question induced him to commence a series of photometrical observations in 1855, which he had continued down to the present day.

He used a telescope, having an opening of about ten inches, and a focal length of thirteen feet. The first attempts made were confined to inspecting separately the different portions of a zone of the orb, that, for example, whose diameter is perpendicular to the diurnal movement. To do this he reduced the field to an angular opening of three minutes, and endeavoured to ascertain at what distance from the edges the phenomenon of the diminution of their brilliancy began. Thus, by moving the telescope from the upper to the lower part of the sun, the different portions of the zone succeeded each other in the field of view. He remarked, that in passing from the centre, where the light is white and uniform for a space of about five-eighths of its radius, to the borders, it was easy to see that the brilliancy and colour of the orb changed. He practised this experiment with a magnifying power of about 200 times. When he examined the surface of the orb, with the aid of a low magnifying power, at the same time reducing the opening of the field of the glass to two small discs of about 50 seconds of a diameter, and adjusted the instrument in such a way as to make one of the openings of the field coincide with the centre of the orb, and the other with its edge, he directly perceived that a notable difference of luminous intensity existed between these two regions, as also a difference of colouring when he used an absorbing neutral glass.

When, with the aid of a mechanical arrangement, he brought the two small discs together, in such a manner that he could determine precisely to what extent he did this, he was able to compare regions adjacent to the centre, the luminous intensity of which was nearly equal to it, and to ascertain whereabouts the strength of the light began to diminish. By the measures he thus obtained (and he compared them more than 1,200 times), he came to the conclusion that the region of the solar disc, where the diminution began to be sensible, was situated at a distance from the centre equal to the 364-thousandth of the radius.

In the preceding experiments the centres of the two small circular openings of the field were still separated the 364-thousandth of the radius. To remedy this he placed a birefrangent prism in the eye-piece of the telescope, in order to bring in contact the two small luminous discs, and thus more easily appreciate their difference. This circumstance led him to inquire if the ordinary image of a facula superposed by this means on the extraordinary image of the penumbra of a neighbouring spot would not reproduce a brilliancy almost equal to the total luminous intensity of the sun. In the course of these attempts he added a plate of ourmaline, belonging to a polariscope, to his apparatus, and soon got a very handy photometer for controlling his experiments.

Up to 1857 he was unaware that M. Arago had been making similar experiments, and, when he became acquainted with the fact, he was near giving up his researches altogether, but there were two points which seemed to him to merit further examination, and these were the rapid increase in the luminous intensity of the sky in the immediate vicinity of the sun, and the decrease in the brilliancy of the orb from the centre to the circumference. He therefore resumed his labours by alternately employing a plate of ourmaline, or a Nicol's prism combined with a birefrangent prism, having a movement of rotation on itself. He applied this apparatus to the eye-piece of a telescope furnished with a clock-work movement. By means of these prisms he was able to bring the light derived from the centre of the sun into close proximity with that derived from its edges, and to compare the difference. There was a difficulty, however, in doing this with a rigorous exactness, inasmuch as the light at the edge was not uniform, whereas that in the centre was; moreover, this difficulty was heightened by the fact, that the solar disc near the edges presents a distinct yellow tint, while the centre emitted a light which was pure white by comparison. He proposes to make some further researches on this subject, and to exhibit two solar spectra side by side—the one arising from light emitted from the centre of the sun, and the other from the light of its edges.

After each tenth measurement he changed the azimuth of the primitive plan of polarisation, that he might not be influenced by a sameness of reading. Each comparison was effected by passing alternately from one side of the orb to that diametrically opposed to it. For example, the upper edge was compared with the lower a great number of times, while the eastern side was compared with the western, not nearly so often, in consequence of the obstacles presented by the faculæ, which are almost always present in those regions.

In summing up his observations, he arrived at the conclusion, that at the centre of the disc there was a uniform brilliancy over an extent equal to three-tenths of its diameter; from the verge of this brilliant portion the light gradually diminished in such a proportion towards the edges that, in the space between the edge, and an angular distance of 40 seconds, its intensity was less than half that of the centre.

In order to verify his conclusions, he took advantage of the presence of some large spots near the centre of the sun's disc, which were surrounded with penumbra. The penumbra which surround these spots appear as rather dark clouds, by comparison with the brilliancy of the sun at the centre, and nobody, at first sight, would venture to say that they are more luminous than the edge of the sun.

On the 31st of last August the centre of the penumbra of a vast group of solar spots appeared to him to be of a sufficiently uniform brilliancy to put this point to the test. This group was in the inferior hemisphere, had nearly reached the middle of its course, and was situated at a distance from the centre equal to about three-tenths of the radius. One of the circular openings of the field of the telescope was directed on the part of the penumbra he desired to compare with the border of the orb; he then brought the other opening to coincide with this. The result was, that he found the penumbra to be really more brilliant than the borders of the sun.

By means of his photometrical apparatus, and using a magnifying power of from 200 to 300, he has been able to measure the feeblest differences of intensity in the light of the stars.

WINTER PRINTING FROM PAPER NEGATIVES.*

SECTION II.—CASES OF FAILURE, AND MISCELLANEOUS REMARKS.

I. It will be perceived that any development formula can be worked with paper negatives, much as above described. Whether the formula be more or less sensitive (I have seen none published *so* sensitive, or well adapted for wintry days) the point will be the same, to bring the image, by more or less exposure accordingly, to a certain stage.

II. A *soft* negative may be dealt with by an exposure, which will show nothing to the eye but the extreme darks of the image—the invisible action of the light will be much greater through it, and you ought to be able to push the de-

* Continued from vol. iii. p. 160.

velopment and so get vigour in the proof, after such an exposure as has allowed *no* action of light through the feeble darks of the negatives, so that the high lights of the proof are safe to remain. Sun-printing could make nothing of such a negative.

III. A mucilage of gelatine, five grains to the ounce, may be used in place of the moss, but it has the disadvantage of sometimes setting even at this strength, and then requiring to be warmed for use. I have tried linseed mucilage successfully, but it is not equal to the moss.

IV. Some persons would warm the developer, but that tends—1. to cause sinking of the image, by destroying the size; 2. to the more rapid decomposition of the developer itself, with consequent discoloration of the whites of the proof.

V. Chloride of barium is an excellent assistant in keeping clean the whites and preventing the sinking of the image in development printing. It may be substituted for chloride of sodium in the above formula, by those who find a difficulty under these heads, or who intend not to tone.

VI. The developer should be perfectly colourless at first, and very little discoloured when the proof leaves it—if the washing water and the developer become brown and turbid, rules have been neglected.

VII. I think acetic acid should be avoided in a sensitiser for development printing—it penetrates the size of the paper, and tends to cause sinking of the image. Remember, if your proof looks too vigorous by transmitted light, but feeble to look down upon, you may make something of it as a transparency; but you have spoilt it as a good development print. Keeping the paper in the salting and sensitising baths longer than the time prescribed, will tend to this mischief.

VIII. A very good way of developing in warmer weather, is to place a clean square of glass, the size of your proofs, inside a gutta percha tray; then, on removing your print from the frame, draw its back along the top of the basin of clean water put near to wash from the developer, and lay it on the glass, when it will adhere smoothly to it; then pour on a little developer at top, and stroke it over the print with a glass rod. The glass square must be even, and lie very true, and the liquid be renewed when it seems drying in. In this way the air quickens development, and there is, I think, less danger of image-sinking. But this plan needs too much watching in cold weather in long developing. If employed, the glass and rod should be washed and rinsed between each proof.

IX. It is convenient, if you have one or two cameras, to use the slide of one large enough to let you watch the strip, as a printing frame; you can then let down the shutter at the right moment, instead of using a cloth.

X. It may sometimes be well, if you have over-printed, or the negative was weak, to dilute the developer up to one-half additional water.

XI. Be careful not to wash *too* long from the developer, or you might swell the carrageen in the paper, and so disturb and discolour the image. This effect never occurs, detrimentally, in washing after fixing.

XII. An acid toner may be used, with omission of the previous soda soaking. Development prints soon decompose a gold bath; but little, therefore, should be made at once. When the bath turns carmine, or claret-tinted, make a new one. *Filter* it back carefully into the bottle after its first day's use.

XIII. Though warmed solutions may be objectionable, nothing can be better than cold solutions, used in a *warmed* room. The periods of development given imply a cold one.

XIV. An under-printed proof may be developed very far, but it will have a look as if the image had been *dragged out*, rather than developed, showing great roughness in and near the lights.

XV. A negative which has been over-developed, or in some other way has lost its lights, may be also (Rule II.) well printed by development—it will bear a *long* exposure, otherwise the balance of the tones can be restored in developing, as with 2.

XVI. Do not suppose that these are necessarily more operations in development printing than in the ordinary printing. A sun-printing process recommended for beginners in "The Photographic News" (pp. 1, 33, 34, 298), places—

1. Soaking in common water.
2. Soaking in salt and water.
3. Toning (plain gold solution).
4. Soaking in soda and water between exposing and fixing,

and the three first operations, at least, are usual, and ill dispensed with. Acid toning would leave but three, and absence of toning (all but superfluous, save to secure the very best probability of permanence) would leave but two operations here in our process.

Speeding the promoters of plain (but not dead) printing in every form, and being ready to welcome any communications, or to attend to any questions addressed to the author in "The Photographic News," I reach—the end.

B. M. A.

MODIFICATIONS OF THE TAUPENOT PROCESS.

As a perfect dry process is the great desideratum, any information on the subject must be interesting to photographers; for this reason we give a condensed account of two modifications of the Taupenot process—one by M. de Brebisson, which a writer in the *Revue Photographique* describes as being invariably successful, and the other by M. Jouet, which was read at the last meeting of the French Photographic Society.

In M. de Brebisson's process, a very weak collodion is used, composed of

Normal collodion	50 parts.
Sulphuric ether	40 ,,
Iodised alcohol	40 ,,

The normal collodion referred to above contains 23 grains of gun-cotton, 6 cubic inches of sulphuric ether, and one-tenth of this quantity of alcohol. The iodising alcohol is of the same strength, and contains sixty grains of iodide of potassium.

The quality of the collodion used in this process is not of first-rate importance, the essential thing being that it should be of such a density that it will not blister on being sensitised the second time. The plate being coated, it is sensitised in the usual way, in a neutral nitrate of silver bath, after which it is slightly washed in distilled or rain water, to remove the free nitrate of silver, and finally, a small stream of water is made to flow over it. As soon as it has drained for a few seconds, the plate is coated with albumen, which is thus prepared:—To the white of three eggs add two ounces of water, charged with 15 per cent. of dextrine and 15 grains of iodide of potassium. The dextrine should be dissolved in slightly warm water. This mixture must be beaten into a froth, and, after it has stood a sufficient length of time, the solution is ready for use.

The plate having been coated with albumen, is to be sensitised a second time in a bath composed of

Distilled water	100 parts.
Nitrate of silver	8 ,,
Acetic acid, crystallisable	8 ,,

After about thirty seconds' immersion, the plate is removed and washed for a few seconds in rain-water, and a stream of water is allowed to flow over it for five or six seconds afterwards, in order to remove the free nitrate of silver. When it is drained a little, the plate is covered with a weak solution of pyrogallic acid—

Distilled water	3 ounces.
Alcoholic solution of pyrogallic acid, at 2 per cent.	6 drops.

No washing is required after this has been poured on, the plate being left to dry spontaneously. "I have kept plates prepared in this way," says M. de Brebisson, "more than

two months without any perceptible diminution of sensitiveness."

To develop the picture, a saturated solution of gallic acid is used, to which is added a few drops of a weak solution of new aceto-nitrate of silver. Fix with hyposulphite of soda.

The washing with the pyrogallic acid solution is said to give greater sensitiveness to the film, and causes a more speedy development of the picture, to which it likewise gives greater vigour.

One of the advantages claimed for this process is, that it does away with the annoyance of blisters.

M. Jouet's process is as follows:—He first makes a solution composed of

Ether	40 cub. cent.
Chloroform	60 ,,
Powdered amber	5 drachms

This solution having been filtered, is added to collodion highly charged with ether, to the extent, say of 85 to 90 per cent., in the proportion of 4 cub. cent. to three ounces of collodion. When the collodion has well set on the plate, it is sensitised in a bath, composed of

Distilled water	3 ounces
Nitrate of silver	2 drachms
Nitric acid	1 cub. cent.

On removal from the bath the plate is immersed in a dish of distilled water, where it remains until the greasy appearance has left it, which will be in about a minute and a half, after which it is washed under a thin stream of distilled water, and put to dry in the dark room. On the perfect washing of the glass depends the purity of the proof. The time of exposure is about three times as long as for the wet collodion.

Before developing, the plate is moistened with distilled water, and afterwards developed in the usual way, with the pyrogallic acid solution, to which a few drops of nitrate of silver solution have been added. The image appears with great rapidity, two or three minutes being amply sufficient to bring it out thoroughly. "I fancied," says M. Jouet, "that by using citric acid instead of acetic acid in the pyrogallic acid solution, the skies were got of a denser black." The picture is fixed in the usual way.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

Fig. 1.—This background can be easily procured by first straining on the frame or wall a foundation of holland, or calico, or even on the white wall itself, and then pasting on the wall or other foundation a dark moulding—broad and bold in pattern, and then a bold pattern cut out from the centre of a piece of paper-hanging, printed in dark brown or stone colour, the centre to be white or black, as required; if on a wall, a white centre may be left, and a piece of black holland fastened up when a dark background is required, the holland to fit square and clean to the edge of the moulding.

Fig. 1.

Fig. 2.

Fig. 2.—This background may be made by pasting dark brown paper (cut out Gothic pattern) on a wall or frame, and the dark lines formed by pasting broad black tape—evenly and cleanly—for the upright and cross lines. Increased effect may be given to the patterns by running a dark shadow of neutral tint on one side of the pattern.

USE OF ACID IN SILVER-PRINTING SOLUTIONS.

BY C. A. SEELY, ESQ.

The change of sensitised printing paper in the dark is found a serious evil by practical photographers. I know some persons, who, from this cause, waste as much paper as they use. Especially in damp weather or in a damp room, it is impossible to keep the ordinary ammonia-nitrate paper white, beyond a few hours. In changeable weather the fact proves a great annoyance, and often results in serious loss.

Now, the remedy for the evil is very simple, and I am quite surprised that it has not sooner occurred to any one. In Europe the problem has been discussed, how to preserve sensitised paper, and it was found that the essential condition of the ordinary change was due to moisture; and it was proposed to inclose the paper in air-tight boxes—the air being kept dry by chloride of calcium. But this plan involves expense and other inconvenience, and has not been adopted by any one of my acquaintance.

Now, the simple remedy is the addition of acid to the ordinary solution:—Prepare the ammonia-nitrate in the usual way, but finally add a few drops of nitric acid to the solution.

I had come to this conclusion and verified it by experiment, before it occurred to me that Mr. Dixon had applied the same principle in the use of acid in the simple nitrate solution for albumen paper. In a scientific point of view my suggestions here are then but a small addition to what was before known; yet, as practical hints, they may prove of great service. Nearly all of our photographers use the ammonia-nitrate process, and they will easily test the utility of what I recommend.

I also find that by the addition of acid to the ammonia-nitrate it may be used with albumen paper. The acid coagulates the albumen, so that it becomes insoluble. It has seemed to me that paper so prepared is much more sensitive to light, and that more pleasing tints are obtained. Yet this may be only fancy. My experience is too limited to warrant more positive statements.

It is evident that whenever acid is used in the silver solutions for printing, the greatest care must be taken to remove every trace of the acid before the print is placed in the toning bath. The acid may be removed by careful washing in water or neutralising by an alkali.

Critical Notices.

The Bijou Stereoscope. Negretti and Zambra, Hatton Garden.

We are often told that this is a day of small things, and we find this to be true, not only metaphorically but literally. We have full-length portraits that may be almost covered by an eyelash, groups that can be hidden under the section of a pea, and a gallery of portraits of the kings and queens of England, which would be entirely eclipsed by the superposition of an opaque substance, one-sixteenth of an inch square. Among other diminutive marvels which have been recently issued, is the Bijou stereoscope—a tiny thing, which might be put into the waistcoat pocket, and is yet actually capable of containing a whole set of stereograms. One of these novel instruments has been forwarded to us for our opinion, which contains several stereoscopic pictures of scenes in the Crystal Palace. It might be imagined that these pictures, from their small dimensions, are inferior to those of the ordinary size, but this is not so; they are in every respect fully up to the standard of excellence which characterises the productions of the eminent photographers to the Crystal Palace Company. One of these pictures gives us a view of the Nave, and nothing could be more perfect than the manner in which the water is represented, and the leaves of the spreading water-lily, known as the Victoria Regia. Another picture represents one of the apartments of the Mediæval Court—that containing the effigy of Queen Elizabeth, and the recumbent effigy of a mail-clad warrior. Those who have visited the Crystal Palace and remember the elaborate ornamentation of the walls and the richness of the decorations in this court, will appreciate the difficulty of obtaining a negative which should yield a print of such exceedingly small size, and at the same time preserve a perfect representation of the objects; this, however, has been accomplished in the print we are considering. Every detail of the decoration, elaborate as it is, is rendered with the most perfect fidelity, and the delicate gradation of tone could not be surpassed under any circumstances. As regards this latter quality, it exists in all the pictures in the same degree of perfection, but from the objects depicted being larger we are not so much impressed by any of them as by that just mentioned. We have not space to dwell on all the pictures in detail; we can only, therefore, just mention that among them are two other beautiful slides—one of the Assyrian Court, and the other representing a group of statuary in the Greek Court.

The season at which the Bijou stereoscope is brought out is peculiarly appropriate, and we can imagine no prettier present for a young person than one of these ingeniously-constructed instruments, with its beautiful assortment of pictures.

Dictionary of Photography.

Iodide of Potassium.—This important photographic chemical is a compound of one equivalent of iodine and one of potassium. One of the most ordinary methods of preparing it consists in mingling, by weight, three parts of iodine with metallic iron and water; then filtering the solution of iodide of iron which results, treating it with another part of iodine, and precipitating the iron with carbonated or caustic potash, when the solution is complete; at the same time a black oxide of iron deposits itself, and is washed with facility. This process, however, when executed on a large scale, presents some inconveniences. The solution of the iodine, and its transformation into iodide of iron, is effected very slowly: the liquid must be heated, much water must be used, and the operation must be performed in a porcelain or glass vessel, because if an iron one be used, the per-iodide changes rapidly into proto-iodide; and the purposed object, which is to convert the iron into magnetic oxide, is not attained.

Baron von Liebig has recently proposed a slight modification of this method, by the adoption of which this difficulty may be overcome. The iodide of iron is first prepared as above mentioned; but instead of dissolving the other third of iodine in the iodide, it is dissolved in a weak solution of potash; or, if it be desired to prepare the iodide of sodium, in dilute solution of soda, and the precipitation of the iodide of iron is proceeded with by means of this solution, the quantity of the alkaline solution should be a little less than would be required for the complete precipitation, which is concluded with a suitable dose of alkaline carbonate. The precipitate, under the form of a bulky voluminous mass, appears to be of a very unequal composition; but if left in obscurity, and frequently shaken, the protoxide unites perfectly with the per-oxide, and forms the *magnetic* oxide, which by two or three washings is completely freed from the alkaline iodide. If, to form the iodide of iron, only two parts of iodine instead of three be employed, and a third part be dissolved in the caustic alkali intended for the precipitation, hydrated oxide of iron is obtained, which is very fine and pure, and can be easily washed, though less readily, perhaps, than the magnetic oxide. Baron Liebig is of opinion that this method will prevent the losses which are almost inevitable by other modes of preparation. Iodide of potassium crystallises in regular cubes, which are generally of an opaque white colour, and not deliquescent, except in a very damp atmosphere. The crystals are very soluble in water.

The most common impurities are carbonate of potassa, sulphate of potassa, iodate of potassa, and chloride of potassium. The three former impurities may be detected by adding a solution of chloride of barium. The formation of a white precipitate shows the presence of either a carbonate, iodate, or sulphate; and if the precipitate remains undissolved on the addition of a drop of pure dilute nitric acid, it shows that a sulphate is present. Carbonate of potassa is the most objectionable impurity; this may be readily detected by adding lime water to the solution of iodide of potassium; the formation of a precipitate is a proof of the presence of carbonate. Iodide of potassium may be readily purified by dissolving it in strong alcohol, filtering the solution from the insoluble portion, evaporating to dryness, and recrystallising from it. The carbonate, sulphate, and iodate will be left behind insoluble.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Another convenient mode of using the syphon is shown in the annexed engraving. Two holes are pierced through a cork, sufficiently large to admit of the insertion of the plain bent syphon *a*, and the short tube *b*. In order to bring the syphon into use, air is blown through the tube *b* from the mouth, by which means the liquid is forced into the syphon and over the bend of the tube. The current is then established, and will continue until the fluid is exhausted or falls below the level of the discharging aperture of the longer limb. For decanting without disturbing all readily evaporating liquids, such as collodion, varnishes, &c., this will be found a most useful method of using the syphon.

In order to effect the above operation it is necessary to be able to pierce corks properly, and unless a right method be used, this is a somewhat troublesome process, we shall, before proceeding further, give a few hints on the subject.

Boring corks may be effected in several ways, but the most efficient is by means of the cork borer of Dr. Mohr. This consists of a hollow cylinder of brass or tinned iron, the size of the aperture to be made. One end is formed into a cutting edge by a half round file. The other end may either be fixed in a handle, or have the edge of the metal turned over to form a smooth rim to press against with the hand. If not fixed in a handle, a hole should be pierced in the end, near the rim, large enough to admit of the insertion of a piece of stout wire, to act as a lever in using the instrument. They are usually sold in nests of six or twelve, one fitting within the other. The engraving shows the borer inserted in a cork. The cork selected for the purpose should be a good one, and fitting tightly in the neck of the bottle. The cutting edge should be slightly greased on both sides, to facilitate its passage through the cork, which may be pressed firmly against a table or held steadily in the left hand, whilst the borer is pushed with the right hand, and at the same time turned round by means either of the handle or the stout wire which is passed through it, using a motion similar to that of boring with a gimlet. If the cutting edge be sharp, the cork a good one, and the operation be carefully managed, the holes will be clean and perfect, and the small cylinders cut out will serve as corks for smaller bottles. The apertures may be enlarged or finished as may be required by means of a small, tapering cylindrical file, called a rat-tail file.

Where the cork borer is not at hand, corks may be perforated by means of a piece of iron wire of sufficient thickness heated red-hot. In this case the hole should be made a little less than is required, as the cork will be charred to a certain extent, and this charred surface being cleared away, by means of the rat-tail file, the aperture is widened. Corks may be perforated by means of a series of small round files alone, each one in succession being a little larger than the last, in order to enlarge the hole. This is, however, a somewhat slow and tedious operation.

In amateur experiments it will seldom happen that more than one or two sizes of aperture will be required in corks, and the cost of a set of cork borers would be, therefore, an unnecessary expense. At the same time holes are so much more perfectly and easily made with this instrument than by any other means, that it is desirable to possess at least one or two sizes. These the amateur may easily make himself by procuring pieces of brass tube of the required thickness, the edges of one end being readily sharpened by means of a round or half-round file; the other end being pierced to admit of a piece of wire to act as lever in turning the tube round whilst boring. A cork may be tightly fitted into the end to prevent the edges hurting the hand.

Corks fitted with tubes in this manner for syphons and other purposes are best not kept firmly pressed into bottles except whilst actually in use, as long-continued compression destroys their elasticity, and they gradually cease to fit perfectly the apertures they are designed to stop. They should therefore be either loosened or entirely removed when not in actual use for stopping the bottle.

(*To be continued.*)

Photographic Chemistry.

NITRIC ACID, NO_5.

A very good way of testing the purity of nitric acid is to dilute a portion of it with about four times its bulk of distilled water, and put one half in one glass and the other half in another, and add to one of these portions a small quantity of solution of nitrate of silver, and to the other a little solution of nitrate of baryta. If it changes on this addition it is impure.

A very extensive and important group of salts are formed by the combination of nitric acid with bases; these are termed nitrates, and are all soluble in water. From this solubility of its compounds no *precipitant* can be discovered for nitric acid; consequently, it is difficult to detect its presence in solution in small quantities.

To manufacture nitric acid on a small scale as an experiment, all that is required is a retort and a receiver. Put into the retort equal weights of powdered nitre and oil of vitriol, and apply the heat from a lamp or jet of gas. Adapt the tube of the retort to the receiver without using any luting, as the fumes of nitric acid are capable of destroying vegetable or animal matter. Over the receiver a wet cloth must be laid to condense the vapours.

Note. As, in distilling, it is necessary that a current of cold water should flow gently and continuously over the receiver, we may mention that a convenient and cheap cistern may be made by fitting a tap to the lower part of a pail.

Protoxide of Nitrogen, NO, *or Nitrous Oxide*, as it has been sometimes termed, is a transparent, colourless gas, of a sweetish taste. Its specific gravity is 1·527. At the ordinary pressure of the atmosphere it is a gas, but if subjected to a pressure equal to about 50 atmospheres, it is condensed into a liquid, but resumes the gaseous state on the pressure being removed; under the influence, however, of extreme cold combined with pressure, a portion of the condensed gas has remained in a liquid condition for some time, and this has been converted, under the glass of an air pump, into a solid, having much the appearance of snow. A metal immersed in the liquid emits a hissing sound similar to a piece of red-hot iron plunged into water.

This gas is very easily obtained. Drop some nitrate of ammonia into the flask, and fit in the cork with the bent tube. Place the flask over a spirit lamp, and the nitrate will gradually melt, resolving itself into protoxide of nitrogen and water, care being taken that the gas shall not be liberated too rapidly, as will be the case if too great heat is applied. This gas can be collected in the ordinary way over a vessel of water, only, as it is very soluble in cold water, this liquid should be used warm. From the quantity of oxygen which this gas contains —one-half its volume—it is a powerful supporter of combustion. A piece of incandescent charcoal introduced into a glass jar filled with it, burns with great brilliancy; so also does phosphorus, and even a piece of iron wire, if previously heated to a white heat, will consume in it, though not so rapidly.

From the singular effects produced by breathing this gas, it has been termed *laughing gas*. If it be drawn into the lungs by respiration, the person inhaling it becomes highly exhilarated, frequently indulging in fits of laughter, or violent muscular exertion. The effects speedily pass away, and leave no sense of depression behind, such as would follow from excitement produced by intoxicating liquors. In the case of some persons, however, the visible effects of inhaling it are rather likely to cause alarm. We once administered it to three persons taken at random from among a number of workmen: in the first case, the man sang, or rather howled, for he appeared to have no recollection of a tune, breaking off occasionally to indulge in a fit of laughter, and tried to dance, his antics being of the most ridiculous character; the second showed a desire to lecture, and poured forth a number of sentences which appeared to have very little connection with each other, striding up and down the room while doing so, after the manner of a

New Zealand orator. Both of these happened to be men of from twenty to twenty-three years of age; but the third was a man full ten years older, or more. He inhaled the gas vigorously, and, after a few inspirations, dropped the tube and staggered back, the expression of his face being one of bewilderment and alarm. Suddenly, he began to struggle violently as if he were engaged in a life or death contest, and his conduct became so violent, that we found it necessary to direct two of the men to restrain him. These had great difficulty in holding him, and, when they at last succeeded in laying him on the floor, he continued to struggle convulsively for more than a minute. The effect ceased, in his case, as suddenly as it had begun, and he got up quietly without uttering a word from the beginning to the end of the experiment. In neither case did any trace remain of the effects of the gas.

It is necessary, in experimenting with the gas in the manner just described, to be sure that it is quite pure, as it sometimes contains chlorine, arising from the presence of a small quantity of hydrochlorate of ammonia in the nitrate.

The constitution of this gas is easily ascertained by mixing it with an equal volume of hydrogen in the eudiometer, and firing it by means of the electric spark; the explosion which ensues is rather violent, and the result proves that it is composed of 100 parts of nitrogen and 50 parts of oxygen; not mixed, but combined with condensation of one-third.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 12*th December*, 1859.

When giving you an account of the great Photographic Exhibition that took place this year in Paris, I mentioned some proofs on stone, exhibited by M. Asser, of Amsterdam. These specimens were the result of a new process for obtaining positive photographs on paper with printing ink or lithographic ink, which the author has just published (*Revue Photographique*, Paris, November, 1859). I cannot here enter into all the details of the operation, but I can give you an idea of the principles upon which this new process is founded:—Paper *without size*, on account of its great porosity, is easily permeated by water in all its parts. If certain portions of this paper are covered with bichromate of potash which has been solarised, such portions resist the permeating action of the water. Also, solarised bichromate of potash, which has been subsequently heated to as high a temperature as the paper will support without becoming burnt, will take easily, and retain, printing ink. Finally, paper without size, upon which has been obtained a photographic image in bichromate of potash, heated as above, and then damped, will take lithographic ink in the same manner as an ordinary lithographic stone. The portions not acted upon by light, remaining damp, will not allow the ink to adhere to them; whilst those which have undergone the action of light will receive and hold the ink, which may be accumulated on them in as thick a layer as is required. The results are more perfect if the paper be slightly starched on the side which receives the image; but this is not absolutely necessary.

The solution of bichromate employed is very concentrated. After exposure under a negative, the bichromate remaining soluble is washed off as usual. The paper is then dried and heated upon a piece of marble, to as high a temperature as possible. If dried, and then heated, it takes no deformation; if heated too suddenly, its inequalities are put down by ironing or pressing. It is then damped by floating, and placed upon a sheet of previously damped paper on a plate of glass. In this position it receives the ink, care being taken not to employ too great a pressure.

La Lumière publishes a note, by M. Leon Kraft, on a new preparation of iodide of ammonium, a salt much employed in photography. According to the author, the action of bitartrate of ammonia on iodide of potassium is not the only source from which we may obtain iodide of ammonium. Any ammoniacal salt, such as the chloride or nitrate, will act upon iodide of potassium by double decomposition, but the products are difficult to separate completely. Not so, however, when sulphate of ammonia is employed, and this salt is the cheapest compound of ammonia (in France it costs 45 francs the 100 kilogrammes, or about 18s. per 100 lbs. English); 20 grammes of iodide of potassium are dissolved in one glass, and 8 grammes of sulphate of ammonia in another. In each case the least quantity of water possible is employed. The two solutions being mixed are slightly boiled, and then allowed to repose. When cool, the liquid deposits crystals of sulphate of potash, and the supernatant solution contains all the iodide of ammonium. If a slight quantity of sulphate of potash remain in the supernatant liquid, it is deposited by evaporating a little, or by adding a small quantity of alcohol. The solution of iodide of ammonium is allowed to evaporate under a glass jar in presence of sulphuric acid, if it be desired to obtain it in crystals. M. Kraft, however, employs the solution in the following manner:—He notes its volume, and knowing it to contain 18 grammes of iodide, he adds to it the quantity of strong alcohol exactly necessary to obtain a liquid in which each cubic centimètre contains the quantity of iodide used in photographic operations. The whole is then placed in a well-corked bottle, away from the light, and ticketed. The ticket indicates how much iodide is contained in the liquid, per cubic centimètre.

The journal *Cosmos* opens this week with an interesting letter by M. Paul Broca, surgeon to one of the Paris hospitals. After calling attention to the dangers which attend the use of chloroform, ether, carbonic acid, &c., as anæsthetic remedies, the author proceeds to disclose the great success he has met with in operating on a patient rendered insensible to pain by a process discovered or practised about fifteen years ago by Mr. James Braid, in England.

Mr. Braid made known, in a work he published at that time, the following remarkable fact:—When a brilliant object is placed before the eye at about eight or fifteen inches from the face, and the patient be invited to fix his regard constantly upon this object, so as to produce in the muscles of the eye and its appendices a permanent contraction, in a few minutes a peculiar state of catalepsy supervenes. The arms or legs of the patient may be placed in any position, and remain fixed where they are placed by the operator. The organs of sense, that of sight excepted, acquire an exaggerated sensibility at first, but soon a period of torpor, or natural sleep, comes on. To this state Mr. Braid gave the denomination of *hypnotism*, or *nervous sleep*. His experiments have been repeated lately in France by M. Azam, of the Medical School of Bordeaux, who intends publishing the results of his own investigations. They have also been repeated and confirmed by M. Paul Broca, who operated on a female patient for ulcer at the *Hospital Neckar*, while in this state of hypnotism. The operation was performed without pain, the patient having no knowledge of what was going on, and, in fact, being as completely insensible to pain as if chloroform had been employed. As the results of M. Broca's investigation, I will add, that in three cases out of four he succeeded in producing the cataleptic state by the above means. This sleep is of greater or less duration (10 to 20 minutes). The patients are awaked by rubbing above the eyes, and blowing upon the face.

The author does not endeavour to explain this curious state of existence, or to decide whether it is to be attributed, as Mr. Braid supposed, to the fatigue produced by the permanent contraction of the ocular muscles, or to a peculiar congestion of the veinous sinews at the basis of the cranium, &c. He thinks, however, that this method of producing insensibility to pain is destined to render very great services in surgery, without presenting any of the dangers attending the use of chloroform, ether, amyline, &c.

At a late meeting of the Paris Academy of Sciences, M. Babinet referred again to certain natural phenomena, owing

to the rotation of the earth upon its axis, and which I mentioned in a former letter. The author gives to-day a list of the principal phenomena which are influenced by the earth's rotation. Such are the pendulum and gyroscope experiments of M. Foucault, and the experiments of M. Perrot, to all of which I have before alluded; next, the phenomena attending falling bodies, the deviation of projectiles, marine currents, trade-winds, cyclones or tornados, the effects of wind, the direction of water-courses, &c. On this occasion M. Leymerie made known some facts concerning the rivers that descend from the Pyrenees, and which confirm the theory professed by M. Babinet. The Garonne, more especially, wears away its right bank, in virtue of the rotary movement of the earth, and M. Leymerie shows, by certain geological considerations, that this erosive action must have been, in ante-historic times, far greater than it is at the present day.

The search after a new planet, supposed to exist between Mercury and the sun, continues to occupy astronomers. Mr. Herrick addresses, from America, a letter to M. Leverrier, in which a number of observations, accumulated for many years, are recorded. They tend to prove that a planet existing in these regions, and accompanied by a large satellite, has been often seen, and as often lost. Mr. Herrick supposes that the orbit of this planet has a great inclination.

M. Buys Ballot also addresses to the French Academy a note, in which he establishes, that long ago he was led to admit, as Mr. Herrick had done, the existence of a planet between Mercury and the sun, or, at least, of a planetary belt, to which he attributed the variation of solar heat obtained in his investigations of this subject.

Finally, M. Babinet is stated to have observed, during an eclipse of the sun, certain phenomena, which he attributed to a planetary ring, regarded by him as a planet about to be formed, and which he called *Vulcain*.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

The landlord asked if I would remain all night. Ir eplied I was undecided, but most likely I should. He wanted to know where I had come from; but such a question, on the part of such a man, was so unusual, that I saw at once he had suspicions of some kind respecting me, and therefore thought it advisable to treat him with a certain degree of contempt, and take no apparent heed of his question. I managed to get a glance at his face as he was leaving the room, without being observed by him, and I could easily see that he was puzzled what to make of me. The colour of my skin induced him to think that I could not be a native; while, on the other hand, the idea that I might be a foreigner could only have occurred to him indistinctly, his country being so carefully closed against us, that no instance had ever been known of a foreigner penetrating to the interior; and but for the circumstance of my presenting myself in such a denuded condition, there would have been no danger of exciting suspicion, now that I had advanced so far.

After I had strengthened myself by eating some substantial refreshment, instead of the insipid sweetmeats they brought me at first, and recruited the animal heat by swallowing more of the decoction of tea leaves than was my usual custom, I lighted a cigar, and walked to the front of the house. Here I found my horse still standing, munching some green peas which had been cut from a field opposite, for I am almost ashamed to confess that, in attending to my own wants, I had forgotten his. However, the storm had passed away, and, except for an occasional sharp gust of wind, there was nothing to remind me of the terrific storm I had so recently passed through. I thought of Dsetjuma, and looked anxiously down the road for him, but there was no sign of his being near. I could not help noticing that I was the object of great attention on the part of the people standing about, though they all drew back, in the respectful manner customary with them, when I came out. I acknowledged their politeness in the usual form, and occupied myself in caressing my horse, praying all the time internally for Dsetjuma's arrival; but as time crept on and still he did not come, I could bear the anxiety no longer, and going into the house for my cane, I returned, unhooked the bridle from the post, and prepared to mount. I had scarcely thrown my leg across the saddle when the landlord came running out. I told him that I was going to meet some friends, but this did not appear to satisfy him. What he replied I could not quite comprehend, but the sense of it was rendered evident enough by his taking hold of the bridle, and at the same time beckoning to some of the bystanders to come to his assistance. I am strongly opposed to violence of any kind, but I saw that only one course was open to me, and that was to get away at any risk; so, without hesitation, I struck the landlord a blow across the face with my cane, which made him loose the bridle and run back out of reach of a second, and then, without hurry, I rode quietly down the road. No attempt was made to follow me, which convinced me that I had done right in acting as a Japanese of any rank would have acted under similar circumstances.

In proportion as the uneasiness I had felt on my own account wore off, my anxiety respecting Dsetjuma increased; moreover, if anything had happened to him my own fate was pretty certain, especially as I was entirely without money. I reached the spot where the torrent crossed the road, which was now easily passed on horseback, without seeing anything of the party, and things began to look blacker and blacker in my imagination, when I happened to look up a little lane, and there I saw a group of snug-looking thatched cottages, and fastened to the end of one of them a horse, which I at once recognised. Joyfully I rode up the little hill, close to the summit of which the cottages were built, and here, to our mutual gratification, I found Dsetjuma. It appeared that the rush of water had been at first gradual, and this had warned him to take refuge on the higher bank; and after a tedious journey along the fields he found shelter where I had discovered him.

After a few minutes' conversation I proposed that we should go on to the inn I had left; but the persuasions of the people in whose house he had found shelter, had induced him to promise that he would remain there until the morning, consequently, I had no choice but to stay also, as I felt no disposition to go back alone.

I was not sorry that I was going to remain at these cottages, for the view when we went out, on the sort of terrace on which they were built, was lovely in the extreme. The sides of the hill down which we looked was covered with different kinds of grain and vegetables, chief among which was a kind of bean, bearing a pale violet flower. The cultivation extended right across the valley and far up the opposite hill, beyond which rose ominously still higher, and far away in the extreme distance rose the mountains, which it was our intention to traverse to get to the coast. The system of hill cultivation which prevails here in some districts gives an extremely pretty appearance to the country, especially when, as is not unfrequently the case, the summit of the hill is crowned with trees. In the instance of which I am speaking, the trees rose thickly immediately behind the cottages, and presented a dense mass of foliage all the way to the top of the hill. A large number of flowers of different kinds grew around the houses, which, if they had only smelt as fragrantly as they were beautiful to the eye, would have equalled, if not surpassed, any I ever saw. I have often tried to understand the reason why so many flowers in this country, which possess such exceedingly brilliant colours, are either destitute of odour altogether or possess one which is not gratifying, and I have sometimes thought that it may be, at all events in part, owing to the filthy manure which they use, which, while it stimulates the growth of the flower, communicates a taint which destroys its fragrance. As some evidence that this hypothesis is not altogether unfounded, I may mention that I have gathered

* Continued from vol. iii. p. 164.

flowers of the same species, though far inferior in appearance, which were growing wild in the hedges that had a faint but still agreeable odour.

I had almost forgotten to mention, that when it was decided that we would remain at the cottages until the morning, Dsetjuma gave instructions to two of his servants to go on with the palanquin to the inn which I had left and wait our arrival, so as to prevent the chance of the innkeeper making any complaint to the authorities respecting me. Before they left I had all the things taken out, and the apparatus carefully wiped dry, for though the palanquin was closed as tightly as possible, the deluge of rain had been such, that it had found its way through every crevice, and completely soaked everything capable of absorbing water.

When all had been done that could be done to prevent damage to the negatives I had taken, the landlord's dress was thrown in, in which I had so abruptly left his house, and the men started off with their load (no light one, by the way), and we watched them descending the hill, with some regret that they should be forced to travel so far after the fatigues they had already undergone during the day. I cannot help saying a word here in praise of Japanese servants. They are, as a rule, the most willing, docile men I ever saw. Whatever you tell them to do they do it with a cheerful obedience, as if it gave them real satisfaction to serve you, so that it is impossible for a man of any feeling to be tyrannical or overbearing in his treatment of them; and, no doubt, it is owing to this mutual good feeling, that on the one side you find kind, indulgent masters, and, on the other, faithful and affectionate servants. The two men, for example, who had been sent on with the palanquin, tired as they must have been, and knowing how far they had to march before they could rest for the night, looked as cheerful as if they were ordered to perform some agreeable task.

(*To be continued.*)

THE FOTHERGILL PROCESS.

Sir,—As you take a strong interest in the question of the dry process *versus* the wet, I beg to inform you that during the past season I have exposed 174 plates prepared by the Fothergill process, and of these only seventeen were absolute failures, and twenty-three of indifferent quality, the remainder being of fair average excellence. Among the prints I forward you are many which include some more or less ragged figures; these were beggars, whom I utilised at the average cost of about threepence each. There is one print to which I would call your special attention, for it includes a portrait of a vagabond of the coolest impudence, who has hit upon a novel expedient for extracting alms from the pockets of the Queen's lieges by appealing to two of the strongest feelings of their nature—pity and terror. The circumstances under which I made his acquaintance were these:—I had just focused a couple of old thatched cottages almost buried in ivy and rose bushes, when a man who had been standing at the door of one of them began to move towards me. I called out to him not to move until I told him he might do so. He was good enough to do as I told him, and that is how you come to have his portrait. Well, as soon as I had given him leave to move from his position, he came to me, and began telling me that he was an unfortunate "ticket-of-leave" man, who could get no work, and that he was forced to beg, as otherwise he must steal, and he had a conscientious objection to doing that, although he *had* had the misfortune to be convicted of burglary. While he was telling me this he pulled out his ticket of leave and held it close under my nose, that I might verify for myself the truth of his statement; and there was that in the way in which he did this extremely well calculated to excite the charity of a nervous individual, especially as he was a burly, reckless-looking ruffian. I could not get him to tell me how he found his ingenious dodge to answer, but I have no doubt he makes a great deal of money by it. Only imagine how the charitable feelings of men, and especially of women, must be stimulated, when the plea for charity is backed by an undoubted certificate that the beggar is a ruffian who has broken into a house at midnight, or has murdered a man by beating him to death under circumstances which have induced a merciful jury to pronounce his crime to be that of manslaughter only. F. M. B.

Proceedings of Societies.

American Photographical Society.

The last meeting of the Society was held on the evening of the 14th November.

The President being absent, A. W. Whipple, Esq. occupied the chair. Dr. Deck, secretary.

Three new members were elected. Letters were read by the secretary from Mr. Stetson, resigning his position on the committee on membership; from Lieut. M. F. Maury, of Washington, in acknowledgment of his election as honorary member, and from Mr. Marsh in relation to his exhibition of photographic slides in a dissolving view apparatus. Mr. Benj. Garvey was chosen to fill the office vacated by Mr. Stetson. Messrs. Hull, Tillman, and Seely were appointed to make the necessary arrangements with Mr. Marsh for an exhibition before the Society.

Mr. Seely read a paper "On Strengthening Negatives, and the Use of Acid in Ammonia-nitrate Solution."

Mr. Johnson presented to the Society a large and valuable collection of specimens illustrating the early history of the daguerreotype. Among the portraits, were some of distinguished persons, showing how men looked twenty years ago. Mr. Johnson described his process of etching daguerreotypes as practised by him in 1843. The etched daguerreotypes and the prints from them showed a wonderful capability of the process. Among the interesting mementoes of the past, were daguerreotypes gilded by the battery—luxuries for which Messrs. Wolcot and Johnson received an extra fee of 1 dollar 25 cents in London in 1840; also daguerreotypes in the concave of hemispheres, and intended for the dissolving view apparatus. The most recent specimens were views of the sun showing the solar spots.

Messrs. Hedrick, Johnson, and Deck were appointed to consult with Mr. Cooper with reference to the location and arrangement of the museum of the Society.

Mr. Charles Hadfield exhibited some articles of apparatus and dry sensitised plates recently brought from England by his father. The dry plates were prepared in May last. Two of them had recently been exposed, and were developed before the Society. Mr. Hadfield also exhibited two ambrotypes, originally both very dark and indistinct. By redevelopment one of them became a brilliant and bold picture. The hint will prove useful to practical photographers.

Mr. Kuhns said, the use of acid in ammonia-nitrate solution is not new. My instructor, Mr. Rehn, of Philadelphia, in 1854, directed me to add nitric acid to the silver solution. I have also tried acid ammonia-nitrate on albumen paper. But I have abandoned such use of acid altogether.

Mr. Seely: What objection did you find?

Mr. Kuhns: The whites suffered; they turned yellow. To strengthen a negative I prefer to treat it first with bichloride of mercury—then with a weak solution of iodide of potassium. I approve of strengthening negatives: I prefer the condition of things which requires it. My best negatives are such as have been strengthened. I do not like a collodion which gives full intensity at once.

Mr. Garbanati: I cannot agree with Mr. Kuhns' last sentiment. Strengtheners should be kept as reserve forces: it is not good tactics to bring them forward on every occasion.

Mr. Hull: I prefer bromide to iodide of potassium for strengthening with bichloride of mercury. Bromide gives a different colour, and seems to work more evenly.

Mr. Seely: I read my paper this evening with the honest belief that I had made some new and useful discoveries. But it appears to the Society, perhaps, that the alleged discoveries were neither new nor useful. Mr. Rehn recommended acid in ammonia-nitrate solution so long ago as 1854. Mr. Kuhns has also independently used acid ammonia-nitrate on albumen

paper. I feel a little embarrassed under such a statement of facts. Yet I am unwilling to surrender all claim for credit in the matter. If Mr. Rehn in 1854 discovered a useful process, and for five years has held it as a secret for his own advantage, a scientific society like ours may not entertain his merit as a discoverer against the man who, acting independently and honestly, gives to the public the same thing. And it is not unmistakably shown that Mr. Rehn's process, in its object and detail, is the same as my own.* Mr. Kuhns has tried acid in ammonia-nitrate for albumen paper, and with the result that the whites of his prints were ruined. In reply, I can assure Mr. Kuhns and the Society, that he cannot have followed such directions as I have given and which are the conditions of success. The difference between Mr. Kuhns' experiments and my own was little, but yet of sufficient amount to separate failure from success.

Mr. Loiseu called the attention of the Society to the peelling up or exfoliation of the collodion film after drying; asking for information as to the cause and remedy. He had tried three samples of cotton with the same result, his silver and hypo. baths were in order—was aware that the evil might be mitigated by more careful cleaning—but the splitting up took place on some of his cleanest glasses.

Mr. Hunt: The exfoliation is most likely to happen in damp weather. If the plate before cleaning be well heated by a lamp or otherwise, it will not take place. I should look for the antecedents of the evil in the cleaning and the state of the atmosphere.

Mr. Garbanati: To determine if the collodion be at fault—coat the plate and dry it without immersion in the bath—and after sensitising and before fixing.

Mr. Seely: Four or five years since, when I was troubled with the splitting up of the dry films, I satisfied myself that it was occasioned by peculiarities of the gun cotton. This property is quite independent of that contractile disposition which separates the film in the bath. The film which exfoliates may be good in all other respects. If the plate just before collodionising be covered by a minute film of gutta-percha, india rubber, or wax, from a very thin solution in chloroform or ether, the film will adhere to the plate. The whole subject needs further study.

Mr. Tillman: At the late meeting of the British Association, photography was made the most prominent of the special subjects of original papers and discussions; Prince Albert, who is known to be skilled in photography, presided. These facts are gratifying, and show that abroad, as well as at home, photography is the leading subject of scientific research.

The Society then adjourned to the second Monday in December.

* Mr. Rehn probably recommended acid to neutralize any excess of ammonia in the silver solution.—Ed.

Photographic Notes and Queries.

SAILING UNDER FALSE COLOURS.

Sir,—The season is now approaching for photographic exhibitions, and, as a general rule, coloured photographs are excluded, except with a plain photograph alongside. Now, would it not be fair that amateurs, who exhibit prints obtained from ready-prepared plates, should be subject to some such rule, or at least be made to mark them as their own productions, or from prepared plates, as the case may be? I will give a few cases in point, to show how necessary some such rules are:—No. 1. Visiting a town in the neighbourhood, I was shown some nice photographs printed from paper negatives, and the person rather proudly directed my attention to them, as showing what could be done with paper. I gave the gentleman credit for being a careful and successful manipulator, and was then informed that he bought the paper ready sentitised for the camera of Messrs. ——— and Sons. "Oh, indeed! still they are very nicely printed." "Yes," said my informant, "but he sends the negatives to be printed at Mr. ——— of Blackheath;" so the whole of the credit due to the gentleman in question, was for selecting the view and developing the negative. No. 2. Not far from here are the ruins of an old castle, often visited by roaming photographers. Something like the following conversation took place between the "man in charge" and your humble servant, about three months since:—"Dull day, sir; you'll not be able to work much to day?" "Don't know that, my friend, till I try it; may be better than it looks." "Suppose you'll come again, sir, if you do not get the pictures, for Mr. ——— has been here nearly every day, these last nine days, and 'fired away,' as he calls it, two dozen dry plates, and not done yet; but you see, sir, he buys the plates all ready, to save trouble. Hope I shall see him again, first fine day, for he always gives me something for my trouble." A gentle hint to your correspondent. No doubt, when Mr. ——— succeeds, he will give his friends to understand that the process he works is one of the most certain, easy, and delightful processes he ever tried, and he means to stick to it. One more instance, and I have done for the present:—I was visiting a distant part of the country, and strolling over the grounds of an amateur, who holds a position high in the estimation of friends, and to dry photographers, pointed out as a model for them to imitate in a certain dry process, the points of merit in his pictures being so well selected, everything so beautiful, clear, and bright. My attention was attracted to the peculiar arrangement of the grounds, and I soon saw the original of a print I so much admired. Turning to my guide, I was informed that the grounds had been laid out with special reference to the photograph intended to be taken, and nearly all the views, foreign scenery and lake scenery included, had been taken within range of the gentleman's own premises, and for some of the views, numbers of plates had been spoiled, and weeks passed away before the much wished-for still, calm day arrived.

My intention in penning the above is not to detract, even from the little merit due to photographers "sailing under false colours," but to give the full praise that is due to those who go through the whole process they profess to practise. Thos. Gulliver.

17, *Heathfield Street, Swansea.*

PREPARATION OF ALBUMENISED PAPER.

Sir,—A good deal has been said, from time to time, respecting the use of albumenised paper, some advocating its use, while others have condemned it in no measured terms. Undoubtedly for some subjects plain paper is preferable to albumenised, producing more artistic proofs; but for stereoscopic prints we cannot have too high a glaze, so as to lessen the rough surface of the paper, and be enabled to get the detail of every picture well brought out. It is chiefly with regard to stereoscopic pictures that I would make a few remarks. Being a member of the Exchange Club, I believe that every member would like to send as good prints for exchange as he possibly could; and having, by perusing the pages of your excellent periodical, found that some complaint has been made of the quality of some of the exchanged prints, I trust my humble remarks may not be without some little use.

I would say to every one who prints his own pictures: Prepare your own paper—for it very often happens that for the "very best that can be had" (I quote the words said to me in one establishment) you are supplied with an article that never ought to have been called albumenised paper at all, and which, for the purpose intended, is nearly worthless. The following mode of preparation, which I have used for some time very successfully, may, perhaps, be of service to some tyro in the art, who may (as I was some years ago) have been troubled to get a nice, even coating on his paper. The preparation of the albumen is as follows:—Take any quantity of whites of eggs (they are best fresh), and add to each ounce of albumen 10 or 12 grains of pure chloride of sodium, powdered very fine, and allow it to dissolve—the dissolution can be hastened by stirring with a glass rod—and when it is all dissolved, beat up the whole to a thick froth. For this purpose I employ a very simple contrivance, made by twisting tightly three pieces of galvanised wire,

leaving the ends loose, its being worked by rapid motion of the hands soon accomplishes the desired result. When it is thoroughly beaten up, it should be covered up from dust, and allowed to return to the liquid state. For use, a quantity should be poured out into a flat dish, or a level glass plate, and the paper (having previously ascertained that it is quite dry) should be taken by the thumb and finger of each hand and bent backwards so as to form an inverted arch, the centre of the paper should be brought down upon the liquid, and each end gradually lowered. After allowing it to remain in contact for a few seconds lift it up, in order to see if any air bubbles are upon the surface, which should be removed by the end of a glass rod. It should then be lowered again, and allowed to remain one or two minutes, according to the thickness of the paper. When removed from the albumen, it should be pinned up to dry; one of the corners should be doubled back so that no albumen adheres to it, and by this corner it should be pinned up. When dry, it is as well to pass a moderately hot iron over the back of the paper, though this may be dispensed with. For the printing process, I cannot do better than recommend all to use the one given by "θ," in vol. ii., p. 15; it is *the* best, and any tone, from a rich purple brown to a jet black, can be obtained. If this process were well attended to, we should not hear so many complaints about inferior and faded pictures.

An Admirer of the "Photo. News."

HAS THE VAPOUR FROM PINE ANY DETRIMENTAL EFFECT ON THE NITRATE BATH?

Sir,—In answer to your correspondent, "H. R. R.," in a recent number of the "News," I beg to say that I very much doubt whether the deposit he mentions was caused by the vapour from pine. I, some six months since, made myself a photographic tent, the top and bottom of which is of this wood; and as soon as I had finished it (in fact, before the glue was dry), I used it. The wood being quite new, the smell from it was very strong, so much so, that I feared it would prevent my working in it, at least for some time; but I was agreeably surprised, for my negatives were very clear, and perfectly free from fog. I have worked in it ever since (always using it in preference to a dark "room," even when at home), and have not experienced any detrimental effects thereby.

Your correspondent, "H. R. R.," says that the "deposit resembled that found in old gutta-percha baths;" this, so far, carries out a belief that I have, that *good* gutta percha is in no way injurious to silver solutions, for it shows that glass baths are not exempt from this so-called gutta-percha evil. I have always used a home-made bath, the gutta-percha for which cost 2s. 6d. per lb., and have never been troubled by it at all. Would your correspondent say whether he used a fresh collodion, or added any alkali to his bath when the change took place? as I am of opinion that to some such cause should be laid the charge that is now brought against gutta percha.

Mind, Mr. Editor, I am no vendor of this material, but only speak of it as I have always found it—viz., as a good and faithful servant to photographers in general.

I inclose a print from one of my negatives, which negative was excited in the above-mentioned bath of gutta percha, and manipulated in the tent (the subject of the first part of my letter), directly after making it. The print was toned by the formula of your talented correspondent, "θ," as given at vol. ii., page 16, of the "News." This is the first time I have tried his method; but it certainly is the best of the easy-to-be-manipulated ones I have ever tried.

Oxoniensis.

[The print is a most excellent one, and shows clearly that the negative could not have experienced any ill effects from either the pine wood or the gutta-percha bath. The process by which it was printed well deserves the praise which our correspondent bestows upon it.—Ed.]

GUN-COTTON INSUFFICIENTLY WASHED.

Sir,—I prepare all my own materials except gun-cotton, and to this I wish to draw the attention of my brother photographers, for a mishap that happened to me some time ago, and which might be repeated in their own case. About eight or nine months ago I purchased some gun-cotton, and in the evening I made some iodised collodion; and I scarcely need tell you what was my surprise, on awaking on the following morning, to find it most horribly red. Fearing that some impurity might have found its way into the collodion whilst I was preparing it, I made some more, bestowing upon it, however, a great deal of attention, but all to no use. In about three hours after iodization, my collodion was just as red as the previous one. The chemist, where I bought the gun-cotton, was quite at a loss how to account for all this, when I had the happy idea of immersing part of it in some water, and after having been there for a few minutes, I tested it with litmus-paper, which immediately turned red, plainly showing that the cotton, after having undergone the action of the acids SO_3 and NO_5 (sulphuric and nitric acids), had been tried when imperfectly washed. Since then, even in the case of its being perfectly and thoroughly well washed, I prefer to pass it through a very weak solution of ammonia, as I found this of great improvement in using collodions iodised with metallic salts, such as cadmium. If, however, the proportion of ammonia is too large, it would I suppose, give rise to fogging.

G. M. Ferri.

TO CORRESPONDENTS.

P. R. O.—If your positive exciting solution is only slightly discoloured, you may continue to use it with impunity; but, if it is so dark as to vie with port wine in colour, by all means take steps to discolourise it or your positives will not fail to be discoloured. Precipitated chloride of silver is a very good thing for this purpose; for the methods of using which consult MM. Davanne and Girard's papers in our recent numbers.

J. Williamson.—The lens is well adapted for showing photographic transparencies in the magic lantern. A solar oil lamp will do, if you do not wish to go to the expense of the Lime Light. Very beautiful photographic transparencies for the magic lantern may be obtained at Negretti's.

Troubled Spirit.—1. We cannot recommend any particular maker. 2. It may be thinned. 3 It makes the collodion very slow. 4. A matter of taste; try half a grain of bromide of ammonium to an ounce of the collodion. 5. Sufficient will accumulate. 6. We know nothing of them.

R. L.—The description of the camera is received with many thanks. We shall be pleased to receive the other description mentioned. The tone of the print is perfect; you could not improve it.

E. C.—Collodion is liable to lose its fluidity when kept, owing to the evaporation of the ether. Cadmium collodion will also become glutinous, even if kept closely stoppered.

Beginner.—Neutralise the acetic acid in just the same way as you would the nitric acid; remembering that as the acid is weaker, less soda must be added.

J. F. T.—The portrait is as fine a specimen of the art as we have ever seen. The artist who took it would be competent to fill any photographic situation.

H. S. I.—The number has been forwarded. We shall be pleased to see an account of your new tent. The other matter referred to is under discussion.

L. M.—I. The negatives need not be cut in two. 2. The water is unfit to be used for photographic purposes.

Sulphate.—Your bath is old and acid; pictures fixed in it are almost certain to fade in a few months' time.

Inquirer.—They may be obtained at Mackintosh's We have given directions for a proof to be sent.

J. L.—We are not aware if any stereoscopic views of New Zealand or Australia are in the market.

W. C.—The collodion is unsuitable; one should be used which contains a large proportion of a bromide.

J. S. L.—Your only plan is still further to increase the length of your camera.

J. L. S. B.—We know of no better apparatus.

A Photographer.—Consult the index of our first volume.

W. J. S.—Received. Your name shall be inserted.

W. H. S.—We will bear your communication in mind.

C. Eade.—We are sorry we cannot give the desired information.

Frank.—We will shortly give the desired information.

Omega.—Received with thanks.

Communications declined with thanks.—F. O. W.—P. L. M. P.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—Olla.—Alpha.—P. Y. R.—Dec.

Errata.—In our last number, p. 159, col. 1, last line, for *distinction of* read *detriment to*; p. 159, col. 2, line 9, for *well-dried* read *well-sized*.

In Type:—C. Craig.—H. Goble.—T. Gulliver.—N. Otway.—J. E. A.—Jos. Beldon.—Subscriber.—J. Walter.—A. Keene.

⁎ All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

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THE EYE AS A CAMERA OBSCURA.

BY JOHN SPILLER, F.C.S., OF THE WAR DEPARTMENT.

The minute anatomy of the eye and the consideration of the principles involved in the exercise of vision, are subjects which have ever appeared to possess a high degree of scientific interest. There are so many points of intricate and delicate structure to admire; so many and apparently trivial circumstances tending to disturb the proper functions of the human eye; so frequently examples presented of constitutional defect in the power of distinguishing colours; and perhaps much yet to learn before arriving at a full interpretation of the true nature of vision, that every contribution to our store of ascertained facts deserves to have a place, and to be viewed in connection with other considerations bearing on this interesting inquiry.

The chamber of the eye has been often and fitly compared to a camera obscura. The rays of light on entering are, if need be, subjected to limitation by a diaphragm (such is the iris); they undergo their principal refraction in passing through the crystalline lens, are brought to a focus and depict a sharply-defined, inverted image of external objects, painted in all their natural colours on the retina, or sensitive screen, laid out to receive its impression at the farther end of the chamber; whilst the interference of diffused light is prevented by a black pigment amply disposed as a lining on its inner walls.

The delicate structure of the retina has necessitated that a provision should be made for its protection from the scorching effects of excessive heat, and hence we find that the several humours the calorific rays would have to traverse possess the faculty of obstructing the admission of a greater degree of heat than the eye is able safely to bear. If, then, it be proved that the rays of lowest refrangibility, whose vibrations are comparatively tardy, have little or nothing to do with the impression communicated to the brain through the medium of the retina and optic nerve, it becomes an interesting problem to ascertain whether those of high refrangibility and more energetic vibratory power have any influence in this direction; whether, indeed, they are susceptible of transmission through the aqueous, crystalline, and vitreous humours, the cornea, and other transparent parts of the structure of the eye. This inquiry my friend, Mr. Allan B. Dick, and myself, were induced to undertake, in the course of the year 1854, on the recommendation of the lamented Professor George Wilson, whose "Researches on Colour Blindness," and papers in other branches of similar experimental inquiry, will always be read with particular interest. The experiments about to be detailed found a place (as Note F.) in the work just referred to. My belief that the question has an independent interest to photographers generally will be the apology for resuming in these pages the discussion of the subject.

In order to determine whether the chemical rays are capable of transmission through the humours of the eye, we commenced by experimenting upon a bullock's eye, and by paring away from it the sclerotica until the black pigment and choroid coat came into view; a circular aperture of about one-eighth of an inch in diameter was then made through this membrane and the retina, which laid bare the vitreous humour at a point adjacent to the optic nerve and continuous with the axis of vision. The eye was then supported in the brass mounting of a photographic lens (*i.e.* a simple brass tube adapted to the front of a camera), resting at the posterior end on a ring of cork, which fitted tightly into the tube, and retained in front by a diaphragm of one inch aperture so as to permit the cornea to protrude. From the arrangement of the fittings we were quite satisfied that no light, excepting that which passed through the eye, could enter the camera. Within the dark box a strip of black paper, having a rhombic aperture and device cut out from it, was stretched across immediately in front of the prepared collodion plate, so as to throw its image on the latter, in the event of any chemically-active rays finding their way to it. The camera was then pointed to a bright morning sky, and the plate exposed for fifteen seconds; on afterwards applying a solution of sulphate of iron as a developing agent, a very decided figure of the device appeared.

The conclusion derived from the foregoing experiment, although perfectly satisfactory to those who arranged the apparatus, was open to the objection on the part of others that the picture does not present any *primâ-facie* evidence of its being produced by rays which have passed through the eye; we therefore endeavoured to secure a photographic copy of the actual image depicted on the retina. For this purpose another bullock's eye was carefully dissected so as to open a circular space of about three-eighths of an inch in diameter at the back of the eye; the retina was removed, and a very thin film of glass, in shape like a watch-glass, substituted for it; this supported the vitreous humour in its original position, and served also to prevent contact with the photographic paper placed behind to receive the impression. In another trial the retina was left untouched without altering the ultimate result. Iodide of silver paper was then made sensitive to light by a wash of gallo-nitrate of silver and used as in the Talbotype process, small squares of the paper being successively applied to the back of the thin glass film, and exposed for varying periods of time (one minute, on an average) to the different objects to which the bullock's eye was presented. On developing the latent images with a stronger solution of gallo-nitrate of silver very distinct pictures were obtained of a key and of a spotted window curtain.

It is thus established beyond doubt, that, among the photo-chemical rays, some, at least, penetrate the humours of the eye and impinge upon the retina. And inasmuch as the visible portion of the solar spectrum must necessarily and correctly define the limits of the range which the eye is, under ordinary circumstances, capable of appreciating, it

follows that those only of the photographic rays which are associated with colour can have any power in impressing the retina, although they may very possibly be accompanied by others of still higher refrangibility and nearly equal chemical activity, but of which the unaided human eye does not know the existence.

Royal Arsenal, Woolwich, Dec., 1859.

RESEARCHES ON THE RAYS OF THE SOLAR SPECTRUM AND THE DIFFERENT ELECTRIC SPECTRA.

BY M. ROBIQUET.

Frauenhofer thought that the rays of the different spectra depended on the constitution of the luminous source, in which certain kinds of rays were completely wanting. The cause which produces this absence of light has not yet been ascertained. It cannot be attributed to an effect of interference, for in receiving the image of a solar spectrum on a screen, and placing just in front of it a sheet of mica, a fourth of a wave in thickness, none of the rays are modified. And also, if with the vertical edge of the same sheet of mica, we divide one of the two rays H, in two, there is no illumination in the masked part. The existence of the rays of the spectrum is due to quite another cause, and here is the series of experiments by which I am led to find the explanation:—

If, as M. Draper has done, we produce a spectrum with a flint prism and a platinum wire, rendered incandescent by an electric current, this spectrum has no rays; but if a glass cylinder, terminated by perfectly flat discs of glass, and filled with hypo-nitric acid vapours, be interposed, the rays directly reappear. Let us suppose Frauenhofer's spectrum superposed to the preceding, and let us see how these new rays are disposed.

Extreme red (from B to C).—A group of very thin rays, very numerous, and almost equidistant.

Red (immediately after C).—Two very sharply-defined rays.

Limit of the Orange and Yellow (a little before D).—Four rays distinctly marked, especially the third. The ray D is found in the new spectrum, and it is the only one among Frauenhofer's rays.

Yellow (between D and E).—Three equidistant rays.

Greenish Yellow (a little before E).—Two very strong rays.

Green (between E and F).—Two groups of thin, closely-packed rays, forming something like two obscure bands.

Blueish Green (in advance of and very close to F).—A group of very thin rays, very numerous, and yet sufficiently visible.

Blue Violet (from F to G) and *Violet* (from G to H).—Six groups of very numerous rays, barely visible.

By substituting the vapour of iodine or bromine for the nitrous vapour, the nature of the rays again changes. With dry chlorine there is not the slightest appearance of rays; even with a tube, five yards long, there is only a faint illumination in the green and yellow part of the spectrum.

That which takes place with the platinum wire is identical with that seen when other metals are used instead, at least so far as I have been able to observe, and I have used iron, silver, gold, aluminium, copper, sodium, potassium, and chromium. All these metals have been fused and volatilised by the current of a strong pile, then the interpolar communication was suddenly interrupted, and the incandescence lasted long enough for the phenomenon to be observed, if not analysed. These observations confirm the anticipations of M. Foucault, who, in remarking that the spectrum of the charcoal poles brought to a white heat did not present rays, concluded from it that the same ought to be the case with all incandescent bodies.

There are also some experiments which agree perfectly with the preceding. When we regard the spectrum produced by the jet of gas from a burner which throws out a horizontal flame, and by means of an opaque screen, furnished with a very narrow slit, we arrange in such a way that only the radiancy of the blue part falls on the prism, the ray D will be seen to appear very distinctly, two beautiful green rays separated by a black band, three blue rays, and finally, four violet rays. The same phenomenon is reproduced, though in a much slighter degree, with the brilliant part of the flame. We now come to the repetition of the same experiment with a gas burner having twenty holes, and furnished with a chimney and its holder, with regularly-arranged slits; we can no longer see the faintest appearance of rays, no matter how much we may vary the position with respect to the flame.

The appearances presented by spectrums produced with metals volatilised under the influence of electric currents are excessively curious, and the theory of the preceding phenomena is entirely applicable to them.

M. Foucault, in a memoir, published in 1849, studied these spectrums in a general manner, and arrived at very important results. I began by repeating the experiments of this clever physicist—not, be it understood, to verify their exactness, but to habituate myself to delicate observations, before applying myself to the considerations of the metallic ores, the spectrums of which had not yet been examined. The appearances which metallic ores presented were as follow:—

Platinum.—Burns with a white light. The ray D exists. All the parts of the spectrum are covered with very narrow black bands, allowing the different colours to be seen between them, precisely as the light passes through a Venetian blind; and it is thus that these interstices appear like so many very broad brilliant rays, among which may be distinguished the following colours:—Red, six rays; *orange-red*, three rays; *green*, four groups of very thin rays; *indigo*, two rays. All these rays are of dazzling brightness. Finally, we observe in the *blue violet* an almost complete absorption; in the *violet*, three broad and very luminous bands; and in the *extreme violet*, two broad dull rays, corresponding to the two rays H of the solar spectrum.

I have likewise operated with aluminium, gold, chromium, copper, silver, sodium, potassium, and strontium.

The photographic reproduction of all these spectra is difficult, except as regards silver and sodium; the metallic ore has so little fixedness, that it is with the greatest difficulty that images are obtained, the rays of which do not displace each other every instant. In exposing a plate prepared with iodised collodion, we have only five or six seconds at our command, and to obtain an impression of the magnificent ray D of the sodium, the blue rays of aluminium, the two green rays of silver, and the splendid red bands of the strontium, is not to be thought of in such a short time! All these tints have very little photogenic action, notwithstanding their brilliancy; but, from the commencement of the violet rays, two or three seconds suffice to obtain a satisfactory negative; and, what is very remarkable, we observe in this spectrum, invisible to our eyes, but acting strongly on the iodide of silver, rays and bands which strikingly recall, by their arrangement, the coloured parts of the spectrum to which they belong.

The brilliant rays of the electric spectra, produced by the metallic arcs we have just been considering, must not be confounded with those produced by the electric spark, which are due, as M. Masson has demonstrated, to the material particles torn off by the electric fluid in the state of incandescence, and transported through the space which separates the extremities of the conductors. I should not even be astonished if the rays of the electric arc are not secondary rays due to the tearing off of the silicious particles, which always exist to a great extent in the best-prepared pencils.

I have obtained photographic proofs of the solar spectrum, produced by a system of lenses and prisms:—1st, in rock

crystal; 2ndly, in ordinary flint; 3rdly, in Faraday flint; and I have found that, in the first case, all the obscure rays passed; that in the second, nearly half; and in the third, nearly the whole of them were wanting.

Conclusions.—Every incandescent body, whatever its chemical nature, gives a spectrum without rays; if this body, in volatilising, surrounds itself with colourless and transparent vapours, still the rays do not appear; but if the vapours produced are dense, promptly condensable at the ambient temperature, and, with still stronger reason, if they are at the same time coloured, they intercept a more or less considerable portion of the total radiation.

To explain the action of these vapours, one cannot better compare them to anything than to a screen, in the form of a grating, the bars of which, placed at unequal distances, are of an extreme tenuity, and anon of considerable diameter. In the first case, the shadow projected is rendered by very dull, thin rays (rays of the solar spectrum); in the second, the masked rays are in considerable number: real obscure bands are produced, in the interstices of which the luminous and coloured parts appear as so many bands, or brilliant rays (spectra of the metallic ores produced by the pile).

When the spectrum is formed of incandescent particles, transported mechanically, either by the electric fluid of the pile, or by the spark, brilliant secondary rays appear, which it is easy to recognise from the intermittent character.

The invisible portion of these different spectra is subject to the same effects of absorption as the visible part, and these effects may be rendered evident by photography.

I know better than anybody else how much I have left undone in respect to the researches I have just described, but I reckon on completing them with all the care which an inquiry so closely bearing on the nature of light requires, as soon as circumstances enable me to resume it; and when I have been able to get the apparatus constructed necessary to count the rays of the different spectra with precision, to measure the reciprocal distances, and, finally, by more sensitive processes, to obtain photographic prints of all the visible and invisible parts of the spectra produced by the stars and the electric light.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

Fig. 1, a frame 6 × 12, or any required dimensions, made of three-quarter deal, with two uprights and two cross-pieces, to form the opening for window. The window to be made of inch deal, with pieces of black tape tacked across, to give the appearance of panes of glass; two side pieces, hinged on, will keep the set pieces steady. When it can be placed at any convenient distance from the back wall, with the sitter on a chair at the window, some very

Fig. 1.

Fig. 2.

pleasing effects may be obtained. The same applies to background (*fig.* 2), where the sitter can be placed either before or behind, if the centre part of the frame is cut away. These designs may be varied in a number of ways, according to the taste or skill of the photographer; and more pleasing and artistic effects produced than by the old invariable table with a book, or table with some flowers.

THE FOTHERGILL PROCESS.

COMPARATIVE INFLUENCE ON SENSITIVENESS OF DIFFERENT QUANTITIES OF WATER FOR THE FIRST WASHING.

Having been not only the introducer of the method of preparing plates—Fothergill process—by the use of a measured quantity of water, *previous* to the application of the prepared albumen, but maintained *that the presence of a portion of free nitrate of silver, at the time of such application, is essential*, it is evident that, either I am in error or your correspondent, "M. N. P. S.," who, in his communications in previous numbers of the "News," affirms, that the presence of free nitrate is *not* necessary; advocates the *thorough washing* of the sensitised plates previous to applying the albumen; and mentions, in confirmation, that he has thus prepared with success some dozens. I therefore proceed to lay before your readers the result of a few experiments, undertaken with the sole desire of elucidating the

subject, and conducted with special care; many of them, I may add, are merely a repetition of former ones that have been repeatedly performed, and always with the same result.

In order to insure a correct *comparative* result, I have made use of the *same* gaslight, and printed from the *same* negative, placed the same distance from it. I have also, in the majority of cases, used a gallic acid developer, which is not only exceedingly convenient, on account of the little attention required, but possesses the advantage of development being uninfluenced in any way by the operator, when dishes of the same size, evenly placed, and developing solution of equal strength and quantity is used to each plate; but, in the others, I have substituted a strong pyrogallic solution, that it might be ascertained whether a more energetic one influenced the experiment comparatively. In one of the experiments, it will be observed, the sensitised plate has, previous to immersion in the iodide of potassium solution, been well washed in distilled water ONLY; the object of this was to insure the absence of any chloride; as soft water, particularly when collected in underground cisterns, is generally more or less contaminated with alkaline and earthy salts, such as chlorides and sulphates.

MANNER IN WHICH PLATES WERE PREPARED, ALL OF WHICH WERE $6\frac{3}{4}$ BY $3\frac{1}{4}$.	EXPOSURE, DEVELOPER USED, AND RESULT.
No. 1. In the usual manner, by carefully pouring on 4 drachms of distilled water, continuing till greasiness thoroughly disappeared, &c.	No. 1. Exposed *fifteen* minutes; commenced to develop in about ten minutes; complete in about six hours; rather weak; gallic developer.
No. 2. As No. 1; then in a dish, with two lots of water, about 3 ounces each, &c.	No. 2. Exposed *thirty* minutes; not perceptibly commenced to develop until six hours; a very faint picture only in *sixteen* hours; gallic developer.
No. 3. Thoroughly washed, by pouring water upon it for some time in a strong stream from a jug.	No. 3. Exposed *sixty* minutes; development not perceptibly commenced till eight hours, and, at the end of *sixteen* hours, only a faint trace of a picture; gallic developer.
No. 4. Well washed; afterwards soaked, for about ten minutes, in a 3-ounce solution of iodide of potassium, containing 1 grain in each ounce, and again well washed before coating with albumen.	No. 4. Exposed nine and a half *hours*; after being in gallic solution, of same strength as used for the above, for *thirty-six* hours, a slight trace—the outline only—of the picture was visible, which was considerably strengthened after a thirty minutes' application of a 2-grain pyrogallic developer, with a liberal supply of silver.
No. 5. Same as No. 1.	No. 5. Same as No. 1; but, left in developing solution ten hours, the resulting picture more intense than No. 1.
No. 6. Washed with 6 drachms of water in a dish.	No. 6. Exposed *twenty-two and a half* minutes; commenced to develop in rather less than fifteen minutes; after being in developing solution twenty-two hours; rather less intense than No. 5.
No. 7. As No. 6.	No. 7. Exposed *thirty* minutes; commenced to develop a little quicker than No. 5; and, at the end of *ten* hours, slightly more intense.
Nos. 8 and 9. Same as No. 2.	No. 8. Exposed *sixty* minutes. No. 9. Ditto *ninety* minutes; both quite faint after being twenty-two hours in developer. All the above developed with gallic acid, and exposed to a gaslight.
No. 10. As No. 4, but kept in the iodide solution one hour.	No. 10. Exposed *four* hours to *direct light;* developed with a strong pyrogallic developer; in about half an hour there was a picture quite visible, though faint. Here an accident occurred—the film coming off.
No. 11. Well washed in distilled water; placed for an hour in an iodide solution three times the strength of No. 4; then in a second one for half an hour; well washed, &c.	No. 11. Exposed and developed as No. 10; a moderately strong picture at the end of an hour, with a thick deposit of silver on the surface of plate.
No. 12. As No. 10, but with omission of the albumen.	No. 12. Exposure and developer as Nos. 10 and 11; only a very faint outline of a picture at the end of an hour.
No. 13. As No. 12, but substituting ground glass, coated on the rough side, for plain.	No. 13. Exposure and developer same as for No. 10; developed in rather less than *thirty* minutes, and more intense than any other prepared with an equal amount of washing, &c.
No. 14. As No. 1.	No. 14. Exposed (to gaslight) fifteen minutes; same developer used as for No. 10; developed rather quicker, and more intense than No. 15, following.
No. 15. As No. 6.	No. 15. Exposed thirty minutes; developer same as No. 10; commenced to develop in about five minutes, complete in forty-five; not quite so intense as No. 14.
No. 16. Washed in a dish, with two lots of water, before applying albumen, &c.	No. 16. Exposed two hours; developer same as No. 10; only a faint picture at the end of *forty-five* minutes.
No. 17. As No. 1.	No. 17. Exposed thirty minutes; gallic developer.
No. 18. As No. 6, but substituting ground glass for plain.	No. 18. Exposed thirty minutes; gallic developer. Both this and No. 17 commenced developing almost immediately, and were complete in three hours.
No. 19. As No. 16, but substituting ground for plain glass.	No. 19. Exposed *ninety* minutes; gallic developer. Not more than $\frac{1}{4}$ developed in three, but fully in *twelve* hours.

From the preceding, the amount of sensitiveness, as compared with the quantity of water used previous to the application of the prepared albumen, is ascertained to be as follows:—

1 drachm to every $5\frac{1}{2}$ superficial inches	1
$1\frac{1}{2}$ ditto ditto ditto	$\frac{1}{2}$
6 ditto, and repeated, the exact not ascertained, but not more than $\frac{1}{15}$, and probably less than	$\frac{1}{20}$
Entire removal of free nitrate, counting one minute of daylight, in November, equal to fifteen of a gas jet	$\frac{1}{240}$
And the substitution of ground glass for plain, sensitiveness doubled.	

With regard to the conflicting accounts respecting the keeping properties of the prepared plates, I would suggest whether they are not caused, by either *not* sufficiently excluding white light during the preparation or keeping of the plates—it being, I believe, an acknowledged fact, that an action commenced is carried on even in yellow light—or the use of water containing a chloride salt (much of the soft—as I have before observed—and even distilled, water—particularly that obtained from the waste-pipe of steam engines—is impure, the latter from the spirting up, and passing over, of that inside the boiler), and the formation of a chloride of silver, which, judging from the analogous effect of a chloride in the prepared albumen, would materially deteriorate the keeping properties.

When plates are required for long keeping—particularly if during a high temperature—I should recommend the following precautions:—Test the distilled water by adding to a small (separate) portion of it a few drops of a weak solution—say five grains to the ounce—of pure nitrate of silver; if it remains clear, it is fit for the purpose; but if it becomes somewhat milky, reject it. *Well* wash off the albumen. Use as *little* light, and that of as deep a yellow, as possible. Put the plates in a *dark* place to dry, and keep them in perfectly light, or rather *dark*, tight, *tin boxes*, from which the bits of tin filings, and foreign matter attached

to the grooves, have been thoroughly removed; and, if loss of sensitiveness is not a *material* object, use $1\frac{1}{2}$ or even 2 drachms of the tested distilled water—the latter should not be exceeded—instead of *one*, for every $5\frac{1}{2}$ superficial inches sensitised; allowing for the first-named quantity double, and the second, *five* times the exposure, as compared with the one drachm. ALFRED KEENE.

Leamington.

THE ADVANTAGES OF PHOTOGRAPHY IN PAINTING AND SCULPTURE.

BY ALEXANDER WATT.

The art of painting has ever been subservient to the science of chemistry for the production of the various pigments employed by the painter; and in the extent of his knowledge in the preparation of colours, in ancient times, rested the painter's superiority over others less skilled in this respect. In the present day, however, the artist is spared the trouble and loss of time which the making his own pigments would involve—their manufacture being left in the hands of persons who prepare them upon a large scale.

Photography, also, has lent her aid to the artist, and a visible improvement is manifest in the works of those who have devoted themselves occasionally to the taking of views, &c., by photographic agency. The eye of an artist who has accustomed himself to viewing certain scenes upon the focussing screen—where a perfect picture, though inverted, accurate in all its proportions and colouring, is presented to his observation—is, I conceive, much improved thereby, and I have been told that such is the case by an artist of considerable ability.

Again, if an artist desires to paint a scene from Nature, by first taking a photograph of the same, upon returning to his studio he has merely to multiply the size of his photograph until he obtains the dimensions of the picture he intends to paint, and, having the canvas of the required size and form, he cannot fail to produce a more faithful delineation, as far as drawing is concerned, than if he depended merely upon his eye. In the latter case, some of the detail might be wanting; whereas, in the former, all would be accurately depicted, and with those gradations of tone which constitute the beautiful harmony of unerring Nature.

In beholding the works of some of the greatest masters, I have often thought that there has been a lamentable deficiency in a portion of the picture, which I consider of great importance, and which, strange though it be, is frequently very carelessly dealt with, as if the object of the artist was merely to cover in some way that part of the canvas. I allude to the sky; and this has often been daubed in as if by the hand of a house painter. Now, I think the sky is one of the most interesting and beautiful features of a landscape, and why should the artist pass lightly and carelessly over this important feature, especially when sometimes, as far as space is concerned, this forms nearly two-thirds of his picture?

However, now that there are so many fine photographs of natural clouds—possessing all the graceful undulations, and the varied gradations of tone which exist between black and white—I have no doubt artists will devote more attention, in future, to putting in the sky and clouds with as much care as they would bestow upon the landscape itself; and, then, how far more natural will the picture seem to the eye of the spectator!

If a painter occasionally examines a stereogram through the stereoscope, he will receive some highly valuable hints as to the effects of distance; and, since the objects appear to stand out in relief, he may advantageously study how to convey to his canvas those effects—which are only to be seen in the works of a few—which give the appearance of solidity to the objects; hence that flatness, which many paintings present, may, to some extent, be overcome.

In portraiture, also, I think the artist may be aided by photography, inasmuch as he can frequently have for his guidance, during the absence of his sitter, a photograph possessing, in the minutest degree, every detail appertaining to the subject, with all the effects of light and shade; and, thus, with an occasional visit from his sitter, for the purpose of imitating the colouring and improving the expression when necessary, he will, I conceive, be able to make a more faithful representation of the original, and with less trouble, than without the aid of a photograph.

The sculptor may likewise call in the assistance of this art with great advantage; and here the stereoscope will render him essential service, since he can constantly place before his view, with all the boldness of absolute relief—a photograph of the object he desires to model. And thus, not only will the drawing be accurate in every detail, but the sculptor will not require to trust too much to memory to save trouble to his sitter, for he can, at any time, look through the stereoscope, and in an instant the subject appears before him with as much fidelity as if he were but looking through a window at the original itself.

When it is desired to model in marble or stone a group of several figures, if a photograph is first obtained when the group is properly posed, there will be no necessity to go through the trouble of re-posing the group from time to time, as one look now and then through the stereoscope will refresh the sculptor's memory, and thus save him a great deal of trouble.

In modelling animals, and all such objects as are not likely to remain in a given position for a sufficiently long time, a photograph would, doubtless, relieve the sculptor of much annoyance and anxiety.

That I may not be accused of offering suggestions to those who are already acquainted with, and are availing themselves of, the advantages of photography, I beg to say that any observations I have made are merely intended to assist those who may be in a position to require, and in a mood to receive, a friendly hint from any one.

ACTION OF DIFFERENT RE-AGENTS ON IODIDE OF POTASSIUM.

M. de Luca and M. Ubaldini have published the following, as the result of their experiments with the different re-agents of iodide of potassium:—

When nitrate of ammonia and neutral iodide of potassium are thoroughly mixed in free air, and at ordinary temperatures, the mass assumes a yellow tint, and the addition of starch, which takes a blue tint, indicates the presence of free iodine in the mixture. Boric acid of commerce acts in the same manner. These two re-agents, nitrate of ammonia and boric acid, acting on a boiling concentrated solution of iodide of potassium, are capable of liberating iodine.

If to the action of contact that of heat be added, in operating with dry substances, in a tube closed at one end, not only nitrate of ammonia and nitric acid decompose the iodide of potassium, by liberating the violet-coloured vapours of iodine, but the same decomposition and the same liberation occurs when any of the following substances are heated with iodide of potassium,—sulphate, oxalate, carbonate, or hydrochlorate of ammonia, sulphate, nitrate, phosphate, or borate of soda, marine salt of commerce, chloride of potassium or calcium sulphate of potassa or magnesia, nitrate of lime and silicic acid.

The decomposition of iodide of potassium by the above-mentioned substances does not always take place at the same temperature: thus, while silicic acid decomposes the iodide only at the temperature at which glass fuses, boric acid, marine salt, and the nitrates of ammonia and soda, liberate the violet vapours on a slight addition of heat. The oxalate of ammonia decomposes the iodide when it begins to decompose itself; the carbonate and hydrochlorate of ammonia, on a slight accession of heat, enter into fusion with the iodide of potassium, and produce a yellow liquid, which

gives off violet vapours of iodine on contact with the air; finally, the salt of phosphorus, nitrate of lime, chloride of calcium, sulphate of ammonia or magnesia, the sulphate, phosphate, or borate of soda, decompose the iodide at a high temperature, and it is almost at a red heat that we see the violet vapours appear.

The sulphate, phosphate, and carbonate of lime, by the action of heat and air, partially decompose iodide of potassium; but the binoxide of manganese, by the mere action of heat, completely eliminates all the iodine from this iodide. Neither the carbonate or nitrate of potassa, nor the carbonate of soda, exercise any decomposing action on iodide of potassium.

STRENGTHENING NEGATIVES.

BY C. A. SEELY, ESQ.

As a ready method of strengthening negatives, I find the application of the tincture of iodine very useful. For practical directions it is probably sufficient to say, that the film should be dried, washed over with alcohol, then with newly-made tincture of iodine, and finally, with water succeeded by alcohol. The *rationale* of the process is simply the conversion of the silver into iodide of silver, which is actinically opaque by reason of its greater mass, and its canary-yellow colour. If the opacity is not sufficient by this treatment, it may be increased by dipping in a silver solution, exposing to light and developing, and also the opacity may be further and indefinitely increased by fixing, re-iodising, &c. May not this be the germ of a new photo-engraving process?

The only caution which recurs to me in the use of tincture of iodine, is, that the plate should be well washed before its application, and the free iodine must be entirely removed by heating or washing in alcohol, before use in printing.

The Amateur Mechanic.

GLASS—(*continued*).

The use of the cork-borers, described last week, will enable the amateur to improvise an article frequently necessary to all photographers, but which may not always be at hand: we refer to a spirit lamp. A very efficient one for many purposes may be made from a common phial, one of the short two or three ounce phials will answer the purpose best. The cork, which should be a good sound one, and should fit tightly, may be pierced through the centre, and a piece of glass tube inserted, as the wick holder. Perhaps, better than the glass tube for the purpose will be a piece of common sheet tin—that is, tinned iron—or brass, which may be hammered round a piece of wire to form it into a tube. By this means a good and cheap spirit lamp may be easily improvised. It is, perhaps, scarcely needful to inform even the tyro, that in using a spirit lamp it is unnecessary to use pure alcohol or spirits of wine, as methylated spirit, which is less than one-fifth of the price of pure spirit, or even wood naphtha, will answer perfectly well. The spirit lamp is only used to obtain heat; the flame yielding but little light, is comparatively useless for illuminating purposes. Where the photographer is desirous of using his spirit lamp, therefore, for the purpose of obtaining occasional light in his dark room, he may considerably increase its illuminating power by adding one part of camphine to four of alcohol or methylated spirit. These are the proportions, we believe, used for forming what is called in the United States "burning fluid," and is extensively used there in the place of oil, &c., to supply lamps for domestic use. A good light is obtained, but some care is required in using it, as we believe it is somewhat explosive.

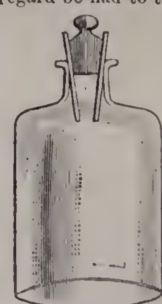
The cork, in such an improvised spirit lamp as we have described, should be sometimes refitted, as, from long use, it will lose its elasticity and cease to stop efficiently.

Good corks fitting well will be found to confine many liquids better than glass stoppers. For collodion bottles they have a great advantage, as they clean the mouth of the bottle every time they are removed, and there is rarely, therefore, any danger of pieces of dry collodion falling on the plate during the process of pouring—a circumstance very common, unless great care be taken, where glass stoppers are used. Corks, however, it will be obvious, are unsuitable for corrosive fluids, or such as are affected by contact with organic matter, and should not be used for stopping bottles containing nitrate of silver, tincture of iodine, chloroform, sulphuric and other acids, &c.

In stoppered bottles, it is a circumstance we regret to say much too common, to find the stopper fitting very imperfectly. When this is the case, the wisest course is to re-grind them. To ascertain whether they fit perfectly, they should, when fitted in the bottle, be pushed laterally in different directions; if they move at all, it is manifest the orifice cannot be properly stopped, and volatile liquids, or such as are injured by contact with the atmosphere, should not remain in a bottle so stopped.

To remedy this defect the stopper should be dipped in a mixture of fine sand or emery and water, and then replaced in the mouth of the bottle, and steadily worked with a turning motion backward and forward for some time, dipping it from time to time in the sand or emery and water. To ascertain if it is sufficiently ground to fit properly, the stopper and neck of the bottle should be washed now and then and carefully tried. When the stopper is found to fit firmly without lateral movement in any direction, it may be finished with a little fine emery mixed with oil, which takes off the extreme roughness left by the sand and water.

As the experimentalist will generally see his stock of stoppers accumulate from the breakage of bottles, he will find it useful sometimes to fit in this way stoppers to bottles the original stoppers of which have been lost, or which have never had stoppers at all. In doing this, some trouble will be saved if due regard be had to the shape as well as the size of the orifice to be fitted.



In some cases the bottle is somewhat wide at the mouth and rapidly contracts in the neck; in other cases, the neck is nearly the same width throughout. By selecting a stopper more or less conical in shape, these varieties in the shape of the neck will be readily met. Where considerable grinding is required, a piece of conical copper is sometimes used to aid the process. The cone is made of sheet copper bent to the proper form and size and then soldered. The stopper is placed in the widest part, and the narrow end is fixed in the bottle, as shown in the margin. Both the end of the copper which works in the bottle and stopper will be dipped in the emery or sand and water, and worked as before described; and then finished in like manner.

(*To be continued.*)

Photographic Chemistry.

NITRIC ACID, NO_5.—(*continued*).

Binoxide of Nitrogen, NO_2, is a colourless, transparent gas, composed of equal volumes of nitrogen and oxygen, which unite without condensation. Its specific gravity is 1·039.

To prepare this gas, take the bottle of which we gave a cut in the article on hydrogen,* and put into it some copper turnings, pour in a little water, and add to this nitric acid in small quantities; effervescence ensues, and the liberated gas is collected over cold water in the usual way. The first sign of gas being given off will be evident in the red fumes with which the retort becomes filled, caused by the contact of this gas with the air; these fumes will gradually be driven out and absorbed by the water, and, until this has been done, no gas should be collected. The reaction in the above is merely the deoxidation of a portion of the nitric acid by the copper; the metal is converted into an oxide, which is dissolved by another portion of the acid.

Lighted bodies do not burn in this gas with the same energy as in the protoxide; a lighted taper immersed in it would be extinguished, and so would most other bodies, although lighted phosphorus burns in it with greater vividness than in the open

* In respect to this bottle, we perceive that the engraver, in cutting the block, has made the tube which carries off the gas to penetrate half way to the bottom, instead of which it ought not to project more than an inch through the cork, while the tube, through which the liquid is introduced, should be within an inch or so of the bottom.

air. As a comburant, therefore, it is inferior to the protoxide, though it contains twice as much oxygen; consequently, it may be inferred that the combination between the two gases is much stronger than in the case of the protoxide. The binoxide also destroys animal life, if breathed for any length of time.

It is readily absorbed by a solution of sulphate of protoxide of iron, to which it communicates a deep brown colour approaching a black, forming a compound of the two substances, which may be again decomposed by boiling; concentrated nitric acid likewise dissolves it in large quantities.

The analysis of this gas can be made by means of potassium in a glass tube; but the most ready way is by means of the endiometer; the result of this analysis preves what we have stated above of its composition, viz., that it is formed of equal volumes of nitrogen and oxygen.

NITROUS ACID, NO_3.

To obtain nitrous acid in a state of purity is a very difficult process. One way of obtaining it is to pass four volumes of binoxide of nitrogen and one volume of oxygen into a glass vessel buried in a strong freezing mixture; by the mixture of the gases, a volatile green liquid is condensed.

It has a strong affinity for water, and remains therein unaltered so long as the water is kept at a very low temperature, but directly it is elevated a little, the nitrous acid decomposes; binoxide of nitrogen is liberated, and the water holds nitric acid. In consequence of this, it cannot be made to unite directly with metallic oxides; but it can be readily obtained in combination with bases. If nitrate of potassa be heated with precaution in a strong glass retort, it is found that at the commencement of the decomposition only oxygen is liberated; it is not until a later period of the decomposition, when a higher temperature has been attained, that nitrogen is mixed with it. In the beginning of the decomposition, the nitrate of potassa, $KO.NO_5$, changes into nitrite of potassa, $KO.NO_3$; so that, if it be stopped at the moment when nitrogen begins to be evolved, the substance which remains in the retort consists principally of nitrite of potassa. This can be dissolved by the agency of alcohol, which leaves the nitrate undecomposed. By pouring into this solution a solution of nitrate of silver, a white crystalline precipitate of nitrite of silver is formed.

HYPONITRIC ACID, NO_4.

We have referred to the deep red fumes which become visible on the contact of binoxide of hydrogen with the atmosphere; these are principally composed of hyponitric acid. These fumes are especially manifest when an equivalent of concentrated sulphuric acid is made to react on an equivalent of nitrate of potassa. The best way of preparing this acid is to heat well-dried nitrate of lead in a hard glass retort, the beak being properly connected with a receiver buried in a freezing mixture. The nitrate of lead is decomposed; the acid is resolved into a mixture of oxygen and hyponitric acid, which, passing into the receiver, is condensed into a liquid; protoxide of lead being left in the retort. It is of a slightly yellow colour, and, as the temperature rises, assumes an orange tint. It boils at 82°, and the vapour which it gives off then is of an intense red colour; the density of this vapour is 1·72.

It has been questioned by some chemists whether this substance is properly termed an acid, its power of forming salts being very limited. In combining with bases it will not produce a hyponitrate; it forms a mixture of nitrate and nitrite: hence, we might consider this substance as a mixture of nitric acid with nitrous acid.

Water decomposes hyponitric acid into binoxide of nitrogen and nitrous acids. If we add only a small quantity of water, monohydrated nitric acid, $NO_5 + HO$, is formed, which dissolves a considerable proportion of nitrous acid, the liquid acquiring a reddish-yellow tint. If the proportion of water be increased by degrees, it passes to a green colour, and finally into a blue, until, by the addition of more water, it becomes colourless.

The nitrous acid of commerce is nitric acid impregnated with hyponitric vapour.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 19*th December*, 1859.

M. Sans, a French photographer, writes to the editor of the *Revue Photographique* on a formula of collodion for direct positives on glass, which may be employed, it appears, with advantage. Direct positive portraits are much in vogue: they have all the fineness of a plate portrait, can be obtained with rapidity, and at a very cheap rate. Although the manipulation by which they are produced is one of the most simple of photographic operations, a certain care is nevertheless essential in the preparation of the baths. An ordinary positive collodion, used with a silver bath containing nitrite, produces a misty image; this defect may be avoided, it is true, by employing crystallised nitrate of silver in a bath of 6 per cent., to which a little alcoholic solution of iodine has been added, but then the sensibility is no longer the same; the time of exposure is trebled or quadrupled, whereas rapidity is very desirable in obtaining direct positive portraits. According to M. Sans, the silver bath must always be perfectly neutral, and the collodion must be improved. The requisite qualities, delicacy, rapidity, and complete transparency, are obtained by employing the following collodion formula:—

Rectified ether at 62°	...	85 cubic centimètres.
Rectified alcohol at 40°	...	28 "
Azotic cotton	... ...	1 gramme.

The solution is allowed to deposit for twenty-four hours, and is then decanted off into an hermetically-corked bottle. This collodion is iodurated with 80 centigrammes of iodide, and 27 of bromide of cadmium, previously dissolved in a little alcohol at 40°. The mixture is allowed to repose for some hours, and then 12 drops of a saturated alcoholic solution of iodine are added. The collodion thus prepared is sensitised with a neutral bath of nitrate of silver at 7 per cent. The development is operated with sulphate of iron:

Filtered rain water	... ...	1,000 cubic centimètres.
Pure sulphate of iron ...	...	130 grammes.
Acetic acid	... ...	80 cubic centimètres.
Nitrate of potash	... ...	8 grammes.
Nitrate of silver	... ...	2 "

The image is fixed by cyanide of potassium:—

Cyanide of potassium ...	... ...	80 grammes.
Filtered rain water	... ...	1,000 cubic centimètres.

It has been shown by Professor George Wilson, that dry chlorine gas has scarcely any action upon vegetable colours, which are also perfectly dry. Litmus papers, both red and blue, that had remained plunged in chlorine gas for twelve years *in the dark*, were only partially discoloured; whilst the same papers exposed to chlorine in the light were discoloured in a few weeks. The gas was perfectly dry in these experiments. Thus, dry chlorine acts very slowly in darkness; its action is more prompt in day-light; that of damp chlorine is instantaneous. So likewise hydrochloric acid, which is perfectly dry, has not an immediate action upon litmus paper; after some time, however, it is reddened, and then carbonised. In all probability, the dry acid had combined with water furnished by the colouring matter itself, before acting in this manner. It has also been shown that carbonic acid, sulphurous acid, hydro-sulphuric acid, &c., when dry, have scarcely any action upon vegetable colours during a space of twelve years, even when the experiment takes place in diffuse light.

MM. Davanne and Girard have made similar experiments whilst studying the causes which tend to destroy photographic proofs. They have shown that if the proofs are perfectly dry, they were not attacked by dry sulphuretted hydrogen; but in the damp gas they soon became changed, and quite yellow. Every one knows what a great affinity silver manifests for sulphur—if a current of hydro-sulphuric acid be passed over a shilling-piece, it will soon become

blackened; but the authors just cited have recently shown that thin silver leaves may be suspended in a current of dry sulphuretted hydrogen without undergoing any change.

I spoke in my last letter of an operation performed by M. Broca at the Hôpital Neckar, the patient having been rendered insensible to pain by the method invented by Mr. Braid. To-day, M. Broca announces, that after having read Mr. Braid's work, which has been forwarded to him, he finds that that author had already practised in England many surgical operations whilst the patients were in a state of hypnotism. In a previous letter, I mentioned some experiments by Dr. Bolley on the manner in which colouring matters were affixed to tissues; in these experiments it was shown that capillary action played no part in the phenomenon. The author has since arrived at the conclusion that colouring matters adhere to tissues as they do to charcoal, which precipitates them from their solution; only they have more affinity, if we may be allowed thus to speak, for charcoal than for tissues of linen, wool, &c.; hence it is necessary to employ mordants which form insoluble compounds with the colouring matters. and render them fixed in presence of water. The author appears to admit that the mordant is in chemical combination with the colour, whilst the latter with the mordant is only mechanically fixed upon the tissue as it would be upon charcoal, when precipitated by this agent from a solution. This theory does not advance us much, for, up to the present time, the attraction of charcoal for colouring matters has always been an unsolved problem with chemists.

A medical man, Dr. Anselmier, read, last Monday, at the Paris Academy of Sciences, a paper entitled, *On Artificial Autophagy—i. e.* how to feed upon one's self! The author has endeavoured to discover a means by which life might be prolonged more than it usually is in cases of shipwreck, and where men are exposed to famine. As soon as the body ceases to receive its proper degree of alimentation, it begins to feed upon itself—to nourish itself for a certain time upon the substance of its own organs. This may be called *spontaneous autophagy*. An absolute privation of food causes, according to the author, a diminution in the production of caloric; death from starvation is the result of the cessation of nutrition which follows this diminution of heat-production, and takes place *before all the materials at the disposal of the body have been consumed.* If, therefore, this diminution of heat be prevented as much as possible, the body will go on eating itself much longer. Now, if blood be drawn, and taken as an aliment, the gastro-intestinal reaction produced by its digestion affords a certain degree of animal heat, and allows the body to live upon itself much longer—death does not take place half so soon as when the animal is left to spontaneous autophagy. M. Anselmier's system of artificial autophagy consists, then, in slight bleedings, which take place daily, the blood being taken as an aliment. To establish these facts, the author has had recourse to some necessarily very cruel experiments, which it is useless to describe here.

I regret to be obliged to mention two severe losses lately sustained by the scientific world in the persons of M. Charles Chevallier, the well-known optician and photographer of Paris, and M. Louis Poinsot, the distinguished mathematician, member of the Paris Academy of Sciences, and of the French Senate. M. Poinsot was born at Paris on the 3rd of January, 1777, and was educated at the Ecole Polytechnique. An elegant discourse was pronounced over his tomb by M. Bertrand, of the Academy of Sciences.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

I LEFT Dsetjuma in the cottage, and walked away by myself a short distance down the hill, where I rested to admire the beautiful scene which stretched away to the point where it was abruptly closed by the range of hills of which I have spoken. I am not sufficiently acquainted with your country to give you an idea of the character of this landscape by likening it to any in England. I think I never saw anything so beautiful in my life before; perhaps, however, I was more impressed by it in consequence of the aspect under which I saw it, presenting so great a contrast to what I had experienced during the day. Instead of the lightning, thunder, and rain, there was a stillness which inspired a certain degree of awe. The various tints of the fields seen under the light of the sun, as it set in a clear, unclouded sky behind the hills, was a sight to remember. The change from day to night was so rapid that almost before this picture had faded from my eye, the details of my landscape were hidden, and I seemed to be looking at the same view through a veil. The sky was clear, and of a bright dark blue, in which the stars shone with twice the lustre they ordinarily exhibited, and directly afterwards the moon rose and threw her white rays over the landscape, which they rendered inexpressibly beautiful. Instead of the hot, stifling atmosphere of the morning, the air had become deliciously cool and refreshing, though there was not a breath of wind stirring. I think, judging from my own experience, that the landscape photographer is, of all men, he who derives the greatest pleasure from observing the wonders and beauties of Nature. The exercise of his profession teaches him to appreciate these beauties, without wearying his mind by studying how best to convey these effects on canvass, as in the case of the painter; he is, consequently, free to indulge in the sentiments which such scenes naturally excite * * * Glow-worms were scattered about, around me, which glittered among the grass like emerald-tinted sparks of fire, and, every now and again, I heard the low, musical sound emitted by an insect common in Japan, but which I never heard except at night, the sound resembling the very low note of a bird. I don't know how long I sat meditating on the ideas which could not fail to be engendered by the beauty and silence of the evening; but I was roused by the sound of somebody vibrating the strings of a kind of guitar, which is very commonly met with here, most of the cottagers possessing one, which has been made at home, more or less roughly. The discordant noise put an end to further thought, so I returned to the cottage. Here I found the whole of the inhabitants, men, women, and children, assembled on the terrace before the cottages, one of the men working away vigorously at the instrument, and, as if fancying that I had been attracted by the beauty of his performance, bursting into a song at my approach, which was infinitely more discordant than the instrument. In fact, I consider Japanese singing detestable, and though I have heard so much as to be almost indifferent to it, I have not got beyond that stage, nor do I think I ever shall. On the other hand, I am bound to confess that they are not more favourably impressed by our mode of singing; at Dsetjuma's request, I one day sang *Der Konigs Lust*, and some old Norwegian airs, but though he liked to hear the curious sound of the words, he frankly confessed that he thought we foreigners were greatly behind his countrymen in this matter; a confession which struck me at the instant as being as strange as the assertion I once heard made by a saw-sharpener, that the most musical sound he ever heard made was that produced by himself in the practice of his profession. To return to the cottages. The people were all collected together outside on the terrace, chattering and laughing, between the intervals of the music, as if they had not a care in the world, as, indeed, I believe they have not, for they don t make a care of anything. These people were better off than the generality of those who live in villages, because, as I found during the evening, in addition to the ground which they cultivated partly for their landlord's benefit, as well as their own, they had permission to cultivate the soil to the foot of the hill for seven years, for their sole benefit; they had still three years before them. It is a very common practice here for a landowner to enter into an arrangement of this kind, for the purpose of bringing any uncultivated land he may

* Continued from vol. iii. p. 178.

happen to possess into the same condition as the rest of his estate, without any cost to himself.

We took our seats among them without any ceremony, although this did not prevent them from paying us the respect which is always rendered from one Japanese to his superior in rank. They brought us sweetmeats, tea, and their substitute for beer, of which they themselves drank a great quantity, they being able to indulge in the former beverage to such an extent, in consequence of the tea-plant growing just above their houses, on the edge of the wood where nothing else could be grown. After we had been sitting a little while, an old man came before Dsetjuma, and asked permission for two of the young men to exhibit their skill in wrestling for our amusement; of course he gave it, and a space being cleared, two men came forward, in the costume of the wrestlers of ancient Greece, and took their places opposite each other and us. One of these was a rather slender fellow, not a bad figure as Japanese go, but the other was a square bony man, whose body presented no end of angles, each more painfully acute than the other. It was quite evident, from the expression of their faces, that each was determined to exert himself to the utmost in the presence of the strangers, and I began to feel a little sorry that the thing had been proposed, as I feared the struggle would go beyond the bounds of play; however, there was no help for it now, and the result must be left to chance. Presently, one raised a shout, to which the other replied by a still louder one, and these shouts were continued through the whole struggle. The two combatants then moved round each other in a kind of dance; suddenly, the slender one made a rush, with his hands raised up, as if he meant to catch his opponent round the neck; the other raised his hands, and, before he could lower them, slender had caught hold of his legs and lifted him off his feet, letting him fall to the ground with a very considerable shock. This feat was rewarded with great applause, especially from the women, whose sympathies were evidently with the man who had the advantage in this first bout. The struggle was renewed, sometimes to the advantage of one, sometimes to the advantage of the other. They did not appear to have any systematic course of proceeding; if they failed to throw each other by a trick at the first onset, they merely clung together and struggled until they were both exhausted or they both went down. After this was over, two of the women began to dance, and these were soon joined by some others. Their dancing was of the most lugubrious character, and would have astonished anybody who had been accustomed to dancing in a continental ball-room. It had not even the merit of being good exercise, as European dancing undoubtedly is, but consisted simply in a slow, monotonous revolution, each performer stopping occasionally to perform a *pas seul*, after the dictates of her imagination, for their movements were not regulated by any rule. The men seemed to enjoy it immensely, as they do everything in the way of amusement.

The consumption of sakhi and tea was astonishing, the women especially drinking enormous quantities of the latter; evidently, it was a *fête* for them. The night was so beautiful that nobody appeared to care about going to sleep, and I believe that many of the cottagers went direct to their work without having closed their eyes. As for Dsetjuma and I, we retired just as a faint gleam of light appeared on the horizon, indicating that the sun was about to make his appearance; and I was soon sound asleep on the mat, where I remained until a later hour than usual.

The first thing I saw when I opened my eyes was a woman sitting on a bundle of wood just outside the door, drawing snails out of their shells with a pair of small iron tweezers, and dropping them into a dish of water. It was the first time I had seen these things being prepared for the *cuisine*, and though I had eaten them often enough to do so without any disgust, the old feeling revived a little when I saw them in this preliminary stage. The operation of inducing them to quit their domicile seemed rather a difficult one, and the woman made but slow progress. I called to her, and suggested that a little gentle hammering between a couple of stones would facilitate matters; but the Japanese have their ideas on the subject of gastronomy like more civilised nations, and I was told that to break the shell wounded the animal and allowed the juices to escape, and it became, in consequence, dry and insipid.

I remember once reading in the *Deutsches* ——, something—I forget what—that the scarcity of water in some of the American hotels in the far west is such that only one pint of water is put in the wash-hand basin each morning, which is made to serve for every individual in succession, and for the same reason a towel was made to serve for an unlimited period; a person who complained that it was dirty being told that he was over-particular, and that "he was the first who had complained, although it had been in constant use for two months." Now, this sort of thing would not suit the Japanese at all. The first thing in the morning man, woman, and child tumble into a tub of water, and they repeat the operation as often as the opportunity offers during the day. The fact is, that it is so intensely hot here in the summer that it is a positive luxury to bathe, and the style of dress being so simple, the trouble of undressing does not form an obstacle to its enjoyment, as is the case in European countries. Their love of bathing being such, it may be imagined that the people at the place of which I am speaking must have suffered great privations from want of water, but this was not so. They had sunk a well a little below the cottages, but the quantity of water in it was very small, and in the summer, when it was most wanted, it was usually dry; consequently, it became necessary to hit upon a contrivance to bring water from a well at the foot of the hill, and the way in which they had accomplished this struck me as being very ingenious. The distance to this well was not great from the cottages, probably not more than a hundred yards, but the ascent was very steep, and the manner in which they conducted the water to the cottages was in this wise:—The end of a tube made of the gum of which I have already spoken, bound externally with flax and coated with gum, was dropped into the well; the remaining portion was carried over—or slung from, I could not clearly see which—the highest branch of a fine tree which spread itself over the spring and thence conducted to the wall above, being supported at short intervals on poles, which gradually diminished in height. They had then managed to exhaust the air from the tube, and the long syphon supplied them with a constant stream of water, which never ceased to run night or day. The diameter of the tube being small, the supply was not rapid, but there was sufficient in the well, notwithstanding the drains that had been made upon it, to provide myself and Dsetjuma each with a bath of delightfully cool water.

(*To be continued.*)

To the Editor of the "Photographic News."

INSTANTANEOUS PORTRAITS AND THE MANAGEMENT OF SITTERS.

Sir,—"How easy it is for gentlemen amateurs, whose experience, perhaps, consists in taking portraits of friends at their leisure, and under the most favourable circumstances, as to the light, and the hundred and one little matters which may make up or mar the effect of a portrait—how easy indeed it is for such a one to write a treatise for the enlightenment of us poor benighted professionals!" Such were my first reflections on reading the letter of Mr. Fennessy on "Instantaneous Portraits," in your number of the 2nd inst.

When I first glanced at the article, I was in hopes we were to be treated with some useful information on the subject, which might be of service during this dull season of the year. I, however, soon found my mistake, as all the information contained in the letter is of a negative character, very much of the same kind as the negative so facetiously described by Mr. Melhuish at the meeting of the Blackheath

Photographic Society, as reported in the same number (pp. 153 and 154).

Mr. Fennessy commences by describing the method of procedure when we enter an "ordinary photographic gallery;" and, from his description, I should infer that it was a *very* "ordinary" one indeed that he had in view—one of those places where a man at the door, with a picture in his hand, importunes all passers; and where the *soi-disant* "artist" is profoundly ignorant of every principle of the art he professes, whether it be chemical, optical, or artistic; unless, indeed, we accept the admission Mr. F. makes a little further on—that his description may be "a little exaggerated;" and I am certainly inclined to think that the latter is most probably the case; for he tells us of the photographer promising to take the portrait in "*only twenty seconds.*" Why, sir, every *photographer* possessing a "quick lens and good chemicals" would, under usual circumstances, consider that to be a most unreasonably long sitting: indeed, we commonly (even at this time of the year) take portraits in from two to five seconds, even with the screens so disposed as to shut out a considerable amount of light; and when infants are to be taken, by letting in a little more light, and more especially if the day be fine, we commonly take instantaneous portraits; but then, by so doing, we have to sacrifice some of the softness of the shading, so that such a plan is only resorted to in extreme cases.

Then Mr. F. recommends us to have an engaging "assistant" to chat with the sitter; and to take only small sizes, which are afterwards to be enlarged. But there is another question (an all-important one to the professional photographer) which Mr. F. quite overlooks—*will it pay?* As a rule, I say it will not; for we find very few (not even *ladies* and *gentlemen*) are willing to pay more for small portraits than their poorer neighbours; and for larger sizes, very few would like to go to the additional expense which must be charged, if we have to take them by the double process. No one surely can deny that a portrait is all the more valuable if "the mind beams from the resemblance;" but I can assure Mr. F. that not all the means he has recommended would give an easy-looking portrait of some people, for they come "to be taken" dressed in most unusual guise, provided with books, great bunches of flowers, &c., and *will* sit either supremely grand, or ridiculously stiff—positions, out of which not all the "agreeable anecdotes" of the pleasing assistant would induce them to move, until your sensitive plate had dried in its holder, "and then all has to be gone over again," with, perhaps, a worse chance than ever.

But though I have said that we commonly take portraits in such a little time, still, there are many days and parts of days when it would be out of all question, even with a "quick lens and good chemicals," and all the manipulatory skill the operator can bring to their aid, to take "instantaneous portraits." Would Mr. F. have us to shut up at such times? That I am sure would not pay. The fact is that the professional photographer must be prepared to take portraits whenever sitters *choose* to come, and in what style they choose to be taken, or they would soon cease to come at all.

J. WALTER.

538, *New Oxford Street, W.C.*

THE PAINTER *v.* THE PHOTOGRAPHER.

SIR,—Allow me to make a few remarks upon a subject common with recent writers on Art, and, it may be presumed, with artists and connoisseurs. They insist that in *portraiture* at least the photographer can never rival the portrait painter of genius, and that the productions of the former must ever be merely *mechanical* operations in comparison with those of the latter; and the reason they allege is, that while the sun-painter can but *literally transcribe* the aspect of the face and figure at one indivisible point of time, the pencil-painter can, at repeated sittings, penetrate beyond the subject's exterior, and perhaps find within higher elements, than appear at all times, if *ever*, externally, and thus put upon his canvas a higher, nobler, better expression.

Now in this view there is much truth, if you suppose the photographer to be (as too many are) a merely *mechanical copyist*, and nothing else, without that penetrative genius which can *detect* spiritual expression, and without that magnetism, the circumambiant atmosphere of genius, which can, through the medium of conversation, looks and gestures, as also by simple *presence*, so enkindle the sitter, that in his face and form his highest and most genial expression shall appear. I would fain ask whether the face and form of a man or woman, when these are completely permeated and overflowing with the finest enthusiasm, caused by some noblest thought or most heroic achievement, do not constitute a canvas, luminous with a loftier, worthier, more spiritual expression, than any artificial canvas inscribed with the pencil marks of even the rarest of created geniuses? The former expression is by "Nature's own sweet and cunning hand" laid on a tablet which her own hand had constructed; the latter is a product of human agency upon a tablet of human workmanship. Which, think you, is likely to be the superior?

The determining question then is, whether the sitter, at the moment of being taken by the sun-pencil, can, by any means, put himself, or be put, into that glow of thought and feeling which shall make his outer man radiant with the light within?

Certainly there is nothing in the necessarily *unstirring*, and therefore somewhat *constrained* position in front of the camera to arouse, or aid in arousing, the general excitement desired, but much rather to *repress* it. Ordinarily, then, the sitter cannot be relied on for *self-magnetization* up to the proper point. The result wished for must be *initiated*, if not wholly produced, by the artist himself; that is, the artist, by the interest of his conversation, by the impress of his manner and genial aspect, and finally, by that influence of his mere personal presence, which, for want of other terms, we style its *magnetism*, must awaken in his subject that mood of spirit, which shall shine through the fleshy inclosure, as his best of expression.

This, to be sure, is an ominous requirement for the operator, and assigns him a task not easy of execution. So be it. Will any one say *how else* the problem can be solved?

The portrait painter can have generally as many sittings with his subject as he pleases—can see and study the latter under many various moods—has time to range over numerous diversities of topics, and thus find by experiment what best answers the purpose of *exciting* his subject; the latter, meanwhile, not being constrained to a *stirless* attitude, but allowed to consult his ease. If, then, he has veritable genius, he has ample opportunity of detecting and representing the expression required.

The case with the photographer is almost wholly the reverse of all this. He has but little time to confer with his subject *prior* to the operation, and the operation itself is nearly *instantaneous*. *How*, then, shall he (if at all) overcome these disadvantages, and awaken in his subject the best expression?

In future communications I may endeavour to give the ablest solution in my power of this problem. There are many items to be considered as regards this matter. The whole subject is well nigh literally new, and untried. For, in all the photographic treatises I have examined, I cannot recall *three* pages that deal *directly* with it. Having made it a special study, I would fain hope I may present something both useful and interesting upon it.

For the present I will close with a single suggestion, which is, that to accomplish the end in question requires *genius*—genius both theoretic and practical—and that nothing else will in any way suffice.

And the time will come—sooner, too, than most persons suspect—when every photographic establishment must have

in its service an artist of genius and accomplishments who shall confine himself to handling the camera; having been thoroughly trained to a knowledge and an application of all its capabilities, and to the production of its best and amplest results. M. A. Root.

Miscellaneous.

Photographic Power of Lightning.—We learn from the *Spartansburg Gazette*, that some time since, at seven o'clock p.m., at the Gaffney Race Course, near Limestone, shortly after a race, some discussion was going on of the preliminaries of another race at a future day, and many were participating in it around a tree. At this time the sun was serenely setting, with no indication of a storm. Suddenly a discharge, loud as a cannon's roar, was heard. The tree was riven by the bolt; and William, a son of Dr. William Nott, leaning against the trunk, was prostrated, as were also some six or eight others, while some four or five were stunned by the electric discharge. Nott lived a few moments only; a man named Long was supposed to be dead, but, though frightfully burnt on various portions of his person, and his boots burst by the subtle fluid, he recovered; Mr. Wilwood was also burnt and scarred; Thomas Gaffney was severely shaken; others, to the number of six or eight, were affected. It may not be peculiar to these cases, but those receiving the charge of electricity, when consciousness returned, thought they had been shot, and looked to see whence the balls came, no one thinking of lightning. We have often heard of the photographic power of electricity, but this is the only instance in which this phenomenon has been certified to us. It was on the person of young Nott. On the front surface of the thigh was indelibly impressed the perfect branch of a tree, leaves and all; and this notwithstanding the part was protected by his pantaloons and drawers. The figure was distinct in all its parts, and of a reddish purple hue.

American Improvement in Photographic Printing.—The *Commercial*, of Cincinnati, speaks of an improvement in the science of photography which will work a complete revolution in the art of picture taking, either from nature or by copy. Its success is a triumph of patient investigation and labour under the influence of impelling genius, which is rarely met with, and which deserves prominent notice as an application of elementary principles to an object calculated to be of great practical use. The inventor, Mr. Charles Fontayne, an experienced photographer, to whom his profession was mainly of interest because of its pleasant field for experiment and development, during a long period of illness, matured in his mind a plan, long considered, of multiplying exact copies of a picture of any kind with great rapidity, so that for the infinite variety of uses to which engravings of any kind may be put, this system of copying will supersede all others. The copy will be an exact counterpart no matter what the original, either of the most delicate engraving, or the largest physical objects which may be encompassed in the lens of a camera. The process is surprisingly simple considering the results accomplished, and in this is its greatest wonder. A chemically-prepared sheet of paper, on which it is designed to print a picture, placed on a cylinder, made to revolve regularly in a box, receives, through an aperture in the side of the box, the exact reflections of a negative of the picture to be taken. The refractions of light are admitted by instantaneous flashes only, being cut off as fast as the cylinder moves on its axis to bring up the surface of the paper for a new impression; and this motion may be as quick as mechanism can make it, for the print is made apparently as fast as light travels. An application of chemicals after this develops the picture in as perfect tone and appearance as any prepared after the old method, and is calculated to be entirely durable. The system is called "Talesmatic."

Electrotyping by Lightning.—In front of the Bibliotheque Imperiale at Paris there exists an open space, ornamented with a large bronze fountain, which was coated with copper by the electrotype process. The operation was carried on in a workshop, built for the purpose, at the neighbouring village of Auteuil. While the upper basin, from which the water flows through sixteen tigers' mouths, was in the bath of sulphate of copper, a violent thunderstorm burst over Paris, and the lightning fell close to the workshop in question. Immediately after the storm had subsided, the electrotyper caused the liquid to be poured off, in order to examine the vase, and to assure himself that the electric fluid had not deranged the deposit. He was extremely surprised to discover that the copper had been deposited on the tigers' heads in streaks or lines, and so happily arranged that they form a veritable tiger's skin, covered with hair, in as perfect a manner as if they had been produced by the hands of a skilful engraver. This curious effect of the electric fluid has accordingly been allowed to remain, and the result is a great addition to the expressive character of the work. The fountain now erected has a square garden round it, and was inaugurated on Aug. 13th, previous to the Emperor's *fête*. The successful completion of this, the largest work ever attempted by the electrotype process, will be followed by an application of a copper deposit on the fountains of the Place de la Concorde, and all the iron and bronze statues in the capital.

Photographic Notes and Queries.

TRANSFERRING POSITIVES TO PAPER.

Sir,—I notice in a recent number a communication from a Mr. Drake describing a transferring process which he has discovered.

I inclose you a receipt I bought more than two years since, and I thought, at the time, that I had been taken in.

I also inclose you a transfer done by the above, to show you how it spoils the picture, especially in the lights, giving them a nasty, dirty, yellow tinge. This was not the only fault; when the picture was bent, it cracked all over. I tried it many times, as carefully as could be, with the same effect.

I have adopted the following plan with much more success:—

Take a $\frac{1}{6}$ size positive picture, and, having washed the cyanide off, pour on 1 drachm of the following solution:—

Water	1 ounce.
Sulphuric acid	60 drops.

Pour it on quickly, and wash off as soon as possible. This must be done carefully, or the collodion will wash off—it is so tender.

Then take a piece of patent leather, and press it gently on the wet film; then lift one corner up, and, if you find it adhere, go on raising it until the collodion is entirely transferred.

You can now hang the picture to dry, and, when dry, it will bend any way without the least injurious effect.

Should the picture not come off at one corner, try the others, until you find the collodion stick.

The lights suffer slightly from the acid.

A thick porous collodion is the best. If the collodion does not come off at all, add a few more drops of acid. Sometimes you will find all the picture come off into the sink when washing it from the acid.

I do not mean to say that this process is certain, yet I have found it more so than any which I have tried. Nor do I wish to claim the process as entirely my own, only part of it.

The idea arose from the manner of preparing parchment-paper mentioned in one of the journals some two years since.

Jos. Beldon.

"*Receipt for Transferring Positives to Paper.*

"Take of asphaltum, ½oz.; of pure oil of turpentine, 1½oz.; mix and dissolve, with the aid of gentle heat, and label 'Solution No. 1.'

"Take of shellac, 1drm.; rectified wood-naphtha, 1oz.; and a few drops of alcohol; mix and dissolve, with the aid of gentle heat, and label 'Solution No. 2.'

"Take of gum arabic, in crystals, 2drms., or 1drm. honey; a very small piece of lump sugar; distilled water, 1oz.; mix

and shake well occasionally till completely dissolved, and label 'Solution No. 3.'

"Having carefully made the three solutions as ordered above, and having procured a positive likeness on glass, dry, either with or without varnish, pour over the collodion or varnish the solution No. 1, tilting to and fro in the usual manner, so as to cover the entire plate, and, when dry and hard, pour solution No. 2 over it in the same manner. When sufficiently dry (which may be known by the dampness that may be felt on the plate, and the very minute globules of unevaporated matter), apply solution No. 3, by means of a camel's-hair brush, over solution No. 2 in this state, taking care to paste well and evenly the edge and corners of the plate. Place over this a piece of paper any size larger than the plate ('Canson's positive paper' is best), and having laid some blotting-paper on the glass, under and above, roll the glass well with a ruler, or any other round body, so as to facilitate the detracting of the film. When the rolling process has been continued for some time, gently turn and draw the picture from the glass, holding the corner of the glass in one hand and the corner of the paper in the other, thus cautiously and gently continuing the drawing, and when loosened at the corners, it will be found that the film will all peel off attached to the paper, and having the appearance of an oil painting. It is generally necessary to cause a gentle stream of water to flow between the film and the plate to facilitate the peeling process.

"Nothing now remains but to hang the picture by one of its corners to dry. It can then be cut to any size necessary."

THE PARAFFINE PAPER PROCESS.

Sir,—You may, perhaps, remember that at the time when you admitted several letters in your valuable paper on the subject of substitutes for ground glass, I wrote to you informing you that I had used fine foreign post paper steeped in paraffine for this purpose, with a result which, in the absence of ground glass, was highly satisfactory, and, indeed, superior in some respects to the glass. This led me to consider whether it might not be made available in the waxed paper process, and, accordingly, I turned my attention to the subject, and have renewed my experiments from time to time, as opportunity offered; but these were of so desultory a character that it was not until I had a paper on the subject, written by Dr. Maddox, put into my hands that I pursued them in a systematic manner. As I have not seen any paper on this subject in the "Photographic News," I do myself the pleasure of forwarding you the following, as I think it may, perhaps, be interesting to many of your readers.

I first of all filtered the paraffine through animal charcoal, to remove the impurities—a very necessary preliminary, as it is usually contaminated with different substances, which would very much interfere with the subsequent manipulations if it were neglected. I poured 6 ounces of the paraffine oil, thus filtered, into a wide-mouthed bottle, standing in a pan of hot water, and to this I added, when warm, 2 drachms of Japan vegetable wax, 5 grains iodide of ammonium, and 2 grains bromide of ammonium, and, when the whole was thoroughly dissolved, I filtered it. I next took some sheets of albumenised paper, which I submitted to the action of this solution for half an hour, and then dried.

To sensitise them I used the solution recommended by Dr. Maddox, viz.:—

Nitrate of silver	40 grains.
Bromide of potassium	1 grain.
Distilled water	2 drachms.

This solution was well shaken, and to it another solution, composed as follows, was gradually added, having been previously filtered:—

Citric acid	2 grains.
Beaufoy's acetic acid	4 drachms.
Distilled water	10 „

I floated the papers in succession on this solution, until they were thoroughly imbued with it; I then removed them, and hung them to dry; after which I placed them between the leaves of a quire of blotting-paper, and screwed the whole down tightly in a hand press.

Paper prepared in this way I found to be very sensitive. I have taken a negative on a not very bright day in seven seconds, but, usually, the exposure required was greater, even when I used a rapid developer. For my part, I prefer to give a longer exposure, and use a slow developer, composed as follows:—

Gallic acid	2 grains,
Distilled water	1 ounce,

with the addition of 1 drop of aceto-nitrate of silver at occasional intervals.

It is my intention to continue my experiments as opportunity offers, but I should be glad if some of your numerous readers, whose opportunities are greater than mine, would consider the subject, and forward you the results of their researches for the general benefit. N. Otway.

JOINING VULCANISED INDIA-RUBBER TUBES.

Sir,—Inclosed I send you a specimen of a joining in india-rubber tubing. It was done some time ago with gutta percha dissolved in methylated chloroform to the consistency of a thin batter, and has been in continual use ever since.—Wishing your "News" (which I read with great interest) every success, I am, &c., J. E. A.

[The specimen received seems as sound and strong at the part joined as at any other part, and the tube will bear considerable stretching without an appearance. The plan recommended by our correspondent will, undoubtedly, prove a great boon to any one who has much to do with vulcanised india-rubber tubing, whether for gas or water carriage.—Ed.]

TO CORRESPONDENTS.

P. Positive.—1. We will forward the desired information by post. 2. We have heard frequent complaints of such a result being produced, when very impure nitrate of silver has been used in the bath, but not when a pure salt was employed. 3. Not on any account.

R. I. S.—We are not acquainted with the principle of the stoves mentioned, but we should not think they would generate anything injurious in your operating room, provided there is vent for the products of combustion.

J. F.—The effect is produced by what has been designated the "reversed action of light." Nothing more is known of this phenomenon than has been described in recent numbers of the "Photographic News."

G. P.—We are sorry for the treatment you have received, but must decline inserting your letter in the "News." Your best remedy would be to apply to a magistrate.

B. W. E.—Too much carbonate of soda was added in the first place. Acetic acid must be added, after filtration, until the solution has a very perceptible acid reaction.

Enquirer.—The formula, as "O" recommends, will give excellent results. You must have used the ammonia bath far too strong, if it turned the prints yellow.

J. Lane.—We will endeavour to procure you the desired information, but fear what you wish cannot be accomplished.

Nemo.—The fixed diaphragm will be very liable to limit the field covered; otherwise, it will not act injuriously.

W. H. W.—We are not acquainted with any artist whom we could recommend for the purpose you require.

W. H. Jennings.—We have a letter for this correspondent. To where shall it be addressed?

?—Some solution has dropped upon the paper, at the parts where the spots show themselves.

L. S. D.—The pictures are very satisfactory. We will insert your name with pleasure.

Despair.—See the varnish recommended by "Sphynx," in our first volume p. 106.

A Cornish Man.—A half-plate camera and lens will be required.

J. S.—The bath is good, but the collodion is insufficiently iodised.

W. J. W.—See an article on the subject in the present number.

J. S. O.—We will give the desired hint the first opportunity.

G. H.—Add a few drops of acetic acid to the bath.

E. B. F.—Received.

Communications declined with thanks.—Alpha.—Pyro.—O. A. K.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—A. E. P.—Mr. S.—Lerebour.—X.

In Type:—H. R. R.—W. May.—Prideaux.—H. M.—C. Craig.—A. J. Melhuish.—H. Goble.—T. Gulliver.—Subscriber.

*** All editorial communications should be addressed to Mr. Crookes, care of Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

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PHOTOGRAPHY AS ONE OF THE FINE ARTS.*

BY A. H. WALL, ESQ.

Before commencing this paper, I pondered carefully upon the character I should or could give it; practical I had determined it should be, useful I hoped it would prove, and yet it absolutely needed an introduction, which in itself would constitute a long communication; I must, therefore, solicit your indulgent consideration. Whenever I take up modern works upon or connected with art, I find, however much they may disagree in regard to various art questions, they are generally harmonious in asserting that photographs are "not works of art;" to look upon them as such, says the *National Magazine*, is a common and ungenerous mistake. Mr. Frank Howard (a gentleman well known as a writer and lecturer upon art) in the thirteenth number of the *Journal of the Photographic Society*, pooh-poohs the idea of photography rivalling even the humblest branch of art, and in a sneering spirit brings prominently forward, and makes the most of, every defect in its productions. A very eloquent and well-written article in the *Quarterly Review* makes much of all its weak points also. In the *Art Journal* for December 1858, a "Dialogue held in an Artist's Studio," appeared under the title of "Photography for Portraits," which displayed no little feeling against the new art. You may perhaps remember that this dialogue takes place between an artist of the ideal school (so much talked of and so little understood), and a certain vulgar, illiterate, nigger overseer, named expressively enough "Dogberry," who visiting an artist's studio in a great hurry, to get his portrait "taken off," naturally enough stops a tediously long time to smoke a cigar, and conduct a long argument with the artist in favour of "photography for portraits." As the artist is a talented, educated, and dreadfully refined individual, and Mr. Dogberry a conceited imbecile, with profound contempt for music, poetry, and painting, but admiring photography and cheap-coloured lithographs, the aforesaid argument is, of course, by no means one-sided, and everybody wonders at the glorious victory achieved by the representative of art over his self-created opponent. I might instance no end of other similar attacks (emanating, in many instances, from disappointed painters), but it is no part of my present purpose to refute their objections.

If we desire to know why photography is thus disparaged, the reason is so plainly visible, that, putting aside every jealousy and all uncharitableness, we have but to look around and see it.

In the first place, among the many thousands of photographs passing before us, how many are there which have the slightest claim to any pictorial element? Alas! the number of these is so sadly small, and photographs have, in a general way, so little pretension to anything approximating to art, that we cannot but regard any want of permanence that they may display as a charitable arrangement of providences brought about by the genii presiding over the beautiful and true. The ease and facility with which a little may be done in photography are its worst foes, and fill our streets with hideous representatives of humanity, our folios with drearily uninteresting specimens of snowy or sooty landscapes, our shop windows with disgustingly indecent, or tawdry theatrical groups under deceptive titles.

In the next place, as a body, photographers have not set up their standard of excellence sufficiently high. Great as the superiority of the productions of to-day may be when compared with those of a few years back, in one vital point they are the same—they have no greater claim to artistic qualities. The reason of this may be found, not in photography, but in its students and professors, who take up the art as a mere amusement, a mere mercantile speculation, or as a purely chemical or optical study, without supposing that, as a branch of art, all the principles of pictorial science are essential to its successful practice. Look at the oldest of our photographic societies, the members of which may surely be thought to have passed the simply rudimental portion of their art; their studies are still confined to manipulatory details; and of all the papers read and discussed at their meetings, how few of them have a tendency to increase their conception and appreciation of even the elementary studies of pictorial art! Compare the art student with the photographic: the first, educated to his profession from early youth, giving years of labour for elementary knowledge, and making every various phase of his progress a subject for earnest study; the other, purchasing his apparatus to-day, and, in a few months, producing pictures, which, being clean, sharp, well-exposed, and well-developed, seem, to him, the legitimate *end* of all his efforts. Again, take up the various representatives of photographic literature, and compare them with those connected with art. The first is almost entirely devoted to the mechanism of photography—baths, processes, and modifications of processes, trivial improvements in apparatus, tents, lenses, cameras, and sometimes, I regret to add, bickerings and disputes, neither dignified nor estimable. The art publication, on the contrary, gives pre-eminence to the scientific principles; enforces rules founded upon the experience of great painters, and the judicious reasoning of great thinkers, the vital importance of which is demonstrated by the productions of the first, the conclusions of the latter, and the instinctive recognition of the uneducated eye.

In making these remarks, I trust I shall not be misunderstood. The mechanism of any art is of great importance, and more particularly is it so in photography; but it should be considered the means, and not the end. The photographic journals are invaluable as aids to progress; but they should aspire to something above the merely mechanical, and be the chief means of raising our beautiful art to its well-deserved niche in the grand domain of Art. For all the errors I venture to denounce, photographers alone are responsible; their works create erroneous impressions on the public mind, and their writings fill the pages of our literary representatives. Indeed, the little done for art in our societies and our journals is but seldom appreciated. To photographers must the appeal be made.

With these few necessary remarks by way of introduction, I will, without ignoring the existence of serious optical and chemical difficulties, take my ground, in opposition to the Frank Howard and Reginald Campbell school of reasoners, by asserting that light plays much the same part in photography that pencils do in drawing, and that photographs are the productions of the camera in exactly the same sense as paintings are the productions of paints; that bad photographs, however numerous they may be, are not more legitimate arguments against photography, than bad paintings are against painting.

Being both photographer and artist, my evidence may be,

* Read at the last Meeting of the South London Photographic Society.

perhaps, received with less suspicion than it might provoke if it emanated from the first or the last only. I propose, then, to throw together a few practical hints upon composition, light and shade, &c., in their application to photography.

I do not think that our most ambitious branch of photographing—that which takes the same relative position as historical painting does to art—will ever attain a permanent standing, for in historical painting the grand aim is not to represent things in actual existence as they really are, but rather to select the scattered fragments of expression or beauty, and blend them into one harmonious whole. For instance, the perfections of many beautiful models are to be found in the great masters' painted females, and few men have the exquisite grace, symmetry, and strength found associated in most of their glorious male figures. Again, the expression to be given is, in this case, not that of a living being, but that which grows into life and power at the magic touch of a refined and cultivated imagination. The legitimate compartments of photography are to be found in groupings, illustrative of various incidents, viz., in landscapes and sea views, in studies from the nude, from cattle, and from objects of various kinds; in portraiture; in representations of still-life, such as that true *artist* photographer, Lake Price, has produced; and in architecture. Surely here is field enough for our labours without hopelessly rivalling unconquerable giants, so high above our pigmy efforts.

Of course I can now merely make very few and brief remarks upon each of these branches.

In grouping figures to illustrate various incidents, the chief element of success lies in the choice of clever models; and, most decidedly, for mere physical characteristics, we shall find our best subjects in the studies of artists; but for facial expression they will be found almost useless;—for this our best models must be sought among men and women whose minds are imbued by nature, or cultivation, with poetic conceptions—who, feeling deeply, will express correctly, the various passions and sentiments required.

And here comes the most serious difficulty. Poetically organised beings are not frequently found among the class of people who would sit to an artist as a model. Occasionally we meet them. I remember seeing a young gentleman of the shoeblack brigade, who was narrating to a suspiciously ragged and dirty young urchin some terrible story. So full of horror was the one boy's face, and so absorbing was the open-mouthed attention inscribed legibly upon the other's, that I stopped, and I found that the brigade boy was simply explaining a passage, in his own emphatic, but not very elegant or grammatical language, from some romance of the blood, bogy, and blue-fire school. Now here was, I doubt not, one who might have been trained into a most excellent model; his features were capable of expressing strongly emotions which he was evidently susceptible of feeling deeply, and these are exactly the qualities needed for a photographer's model. In most of the photographs of this class which I have seen, the models have evidently been chosen for their outside appearance rather than their capability of expression. Models from the stage are seldom of use, being of the stage, stagey. I would therefore advise the photographer who takes up this department to cultivate his conception of the picturesque, and look about him for models in the unexplored scenes of humble life. In depicting passions, we must be careful that by exaggerated expression we do not, as Hamlet says, "tear a passion to tatters," nor "overstep the modesty of nature." Refinement must never be lost sight of in every production of art. To succeed in this branch undoubtedly requires the education of an artist; attention must be particularly directed to the study of expression, in order to select that which is most natural, effective, and true to the purpose. Composition imperatively craves attention; in groups, crowding must be avoided, ungraceful angles in figures or accessories shunned, the laws of proportion and symmetry studied; drawings, paintings, and statuary, especially the antique, should be carefully observed for a perception of the beautiful, and an eye educated to discover it must be arduously sought. The artist should also remember that expression is not confined to the face, but speaks in every motion of the body and limbs, and that certain forms and faces have in themselves poetical expression apart from muscular motion altogether. Variety must not be lost sight of, nor contrast neglected; unity of purpose and the relative subserviency of the parts must be observed, breadth preserved, &c. &c. But I must quit this subject, which is in itself sufficient for several long papers, and content myself by simply adding that much may be done for the picture in the printing and development—or, when several negatives are used, by varying the exposure in the camera, so as to obtain more definition and relief, by stronger lights and shades in one portion than another.

Landscapes next demand a few practical hints, which must indeed be few. In this branch, and that of portraiture, photography has progressed most rapidly. The choice of light is of primary importance in taking a landscape. If the light be immediately before your camera, the objects in the same position must necessarily be in shadow, which may sometimes greatly aid you, if desirable, in procuring a mass of half-tones. A specimen I have brought down, in which the sun has evidently been looking *into the mouth of the lens*, will serve to illustrate this. If the sun be immediately behind your camera, there will, generally, be a want of shadow and force of effect. The position best liked by painters is that in which the light comes from either the right or the left, as we then have strong contrasts of light and dark, nicety of half-tints, and powerful relief; but such must of course depend upon the character of your view, as even this light, in some exceptional cases, might produce a spotty effect, destructive of breadth.

Beyond a doubt, the most brilliant pictures are obtained near mid-day, for both lights and shadows are then most intense, and the exposure is shorter; but photographs so obtained are seldom, I think, very artistic. Nearer morning or evening, when the lengthening shadows blend into masses, and the lights are not so strong as to be destructive of harmony (in the gradations of tone), will be the best time for an artist photographer.

As some portions of your view must necessarily receive the most light, it would be as well if you could so contrive that the strongest light should be found upon the foliage. The faults I most commonly meet with in photographic landscapes, are a want of shadow, and a want of contrast, arising, in many cases, I doubt not, from the operator's almost instinctive dread of the strong lights and shadows of nature resulting in "a soot and whitewash" effect in his picture. I think I have brought down a sufficient proof, in the specimen I shall presently hand round, of the exaggerated nature of this fear. The stops used in lenses are so various and important in their effect, that you must permit me to advise our beginners to try some experiments in this direction. I am inclined to think too small a stop disadvantageous.

Long exposure may destroy some force of effect in the more minute details of the lights, but I think this is more than compensated for by the greater transparency, detail, and purity, obtained in the shadows. Here again, gentlemen, we meet with requirements beyond the mechanical.

Here the taste and artistic knowledge of the photographer will surely be of greater service than his manipulatory and chemical skill, for the last is useless without the first. When he takes out his apparatus, he has not only to choose his scene, with reference to light and shade, as related to pictorial effect, but, to produce really artistic pictures, he must also study the *chiaro-oscuro*, with reference to the peculiar character of the chosen subject, inasmuch as his pictures are, apart from colour, as capable of conveying sentiment as a painter's. This is a fact too commonly overlooked, the mere representation seems nearly always to bound a photographer's aim, and thus it is that there is a strong

impression on the public mind that the photographer's occupation is, after all, worthy only of being classed among the mere handicrafts. Gladness abounds in the brilliancy of sunshine; placidity and peace speak most eloquently in the harmonious blending of subdued tones; and a general gloom, with intense black shadows, has a gaudy, powerful voice when associated with the rugged and the desolate. In printing your picture, its colour may also tend greatly to enhance the sentiment and general effect. Taste, elegance, and expression, should characterise all your productions.

Barnard, in his excellent work upon landscape painting, while praising photographic landscapes for their perfect representation of shades, says—"It must, however, be confessed that even in the most perfect of these photographical productions a certain amount of pictorial effect is wanting, and a deficiency is felt of that concentration of interest caused by a more artistic application of the laws of *chiaro-oscuro*."

Another element of the picturesque has been greatly neglected by the photographer, viz., atmospheric effects. I do think there never was a greater blunder made than that of destroying the aerial perspective of the extreme distance by obtaining the hard line of a cut-out horizon, and the glaringly prominent, all-destroying absurdity, of a white paper sky. If we *must* have clean skies, and will sacrifice atmosphere and perspective to obtain them, why on earth need they be white? Are we not able to graduate them with the greatest ease from a gleam of light near the horizon upwards into tone of any depth? Or, better still, cannot we take a second negative of the identical sky, spread above our view, and, by double printing, give our picture an amount of perfection which, otherwise, it can never claim? The hard horizons at line would even then remain, but it might at least be modified, by the aid of a little wool, or silver paper, in the printing process.

The effect of atmosphere is also too little appreciated in photographing distance, although it is the most enchantingly picturesque of all mediums, lending that soft, dream-like obscurity to the fading objects as they dwindle and recede into air, which is most poetically expressive of all the charms of ever-varying nature. Clear, brilliant days, for distant landscapes may give that wondrous diversity of detail and distinctness which charms the uneducated eye; but, after all, a map has similar qualities in much greater perfection without being either picturesque or strikingly beautiful. Partially condensed vapours on the semi-transparent gleams of sunlight, are in themselves fruitful sources of effects which rouse the artist into a fervour of admiration and a fever of ambitious anxiety. Many suppose that such beauties defy our art, but I have seen many photographs in which their glorious effects have been faithfully rendered. You may, perhaps, remember a stereograph called "The Rising Mist," published some time since. I hoped to have produced this and others, illustrative of atmospheric perspective, with some which I shall presently send round.

Not to dwell longer upon landscape painting (as my motive is rather to call the attention of members to the wide field open to them for study, and the many subjects upon which it is desirable we should have good papers, than to give to any one of my subjects that attention and time which it justly demands), I will now conclude with a few observations upon portraiture.

The remarks made upon grouping will apply with equal force here.

The position of the sitter should be such as will display the greatest variety of graceful undulating lines, and be most characteristic of the individual.

The head should represent the principal light, and minor lights should graduate from it, as a focus to the deepest shadows. The effect will derive great force from the judicious introduction of a spot or focus of intense dark, somewhat near the highest lights; of course, the so-called "spot" must not offend probability nor destroy harmony.

Photographers are not, as a whole, aware of the great importance to be attached to the preservation of pure whites. If we consider that the lights and shadows of nature range from the intense brilliancy of white light to the absolute darkness of a nearly total deprivation of light—white—a photographer can only represent this vast scale by a few tones graduating from white paper, generally seen in a subdued light, to shadows certainly not black, and made considerably lighter, as a surface reflecting light. We shall then see how important it is that we should not lessen our scale of tints by substituting grey for white. I do not know a better illustration of this than is to be found in the alabastrine process. Take an ordinary positive, with its so-called whites, of a light leaden hue—more or less—and whiten it with the alabastrine or bichloride solution, when you will discover that, as the picture whitens, its scale of tones seem suddenly to grow softer and more delicate, and its contours much rounder and more forcible—an effect to be traced solely to the introduction of pure white, and the intensifying of the deeper shadows, or, in other words, to the increased compass of the scale of demitones. The general faults, in most photographic portraits, are the absence of reflected light, the over-exposure of the face, to bring out the details of drapery, and (I know I am about to propound heresy) the horrible sharpness of their definition, which I never can recognise with binocular vision.

I do not recognise the thousand and one cheap abominations in our streets as photographs at all, so must not be considered as referring to such singular productions, whose general faults would alone demand a longer paper.

In lighting the sitter, the light should enter at an angle of not less than 45°. The amount of direct light would be small, and to give delicacy, transparency, and truth to the shadows, light should be reflected from white screens placed upon the shadowed side of the figure. The object to which you direct the sitter's attention should be dark, as it is less fatiguing to the eye than a light one would be, and also, by enlarging the pupil, it improves its expression. Be careful to avoid so placing your white screen as to reflect a glare of white upon the eye. In giving ease to the *pose* do not carry it into affectation, which is as great a fault as awkwardness.

The background should spread the light and aid in securing breadth. A very capital one is made by painting it with colour containing more turpentine than oil, and afterwards slipping in, or near the centre, with the end of a large brush, a colour considerably lighter; graduating it from a centre into the colour first applied.

I must now conclude. In pointing out a new field for our studies and dwelling upon its importance, I hope, gentlemen, you will assist me in bringing forward papers of an *artistic character*, which, blending with the amount of practical, manipulative, and chemical experience, which we already possess, will tend to raise the art we all love high above the sneers and ill-natured attacks of a class of dreaming idealists, who would fain make an artist one of the most mysterious of the world's creations, and his productions should be viewed with unquestioning faith and reverence.

THE PHOTOGRAPHIC SOCIETY.

We some months since suggested that it was advisable, in the interests of photography, that some better arrangement should be made with a view to photographers deriving some benefit from the proceedings of the Photographic Society. We urged that it would be well if a return were made to the system which formerly prevailed, viz.:—Informing certain members beforehand of the subject of the paper to be read, in order that they might come prepared to discuss the matter, and to bring the light of their experience to bear upon it. We were informed that, in future, our suggestion would be adopted, and due notice would be issued to members in consequence. Relying on this promise,

we looked forward to some interesting discussions, for, apart from our personal knowledge of some of the members, it is impossible to look at the countenances of the generality of those who attend the meetings, without feeling convinced that they possess all the intelligence necessary to enable them to speak with authority on matters connected with their profession. We regret to say that the promise made has not been fulfilled. Two meetings have been held since the vacation. At the first of these meetings, the noble president announced that though there was no business before the society on that evening, no less than three papers had been promised, which would be read at subsequent meetings. We presume that the first of these series was represented by M. Ennel's lecture, which we gave in a recent number; but when or by whom the next paper is to be delivered nobody has the remotest idea. What will be the probable consequence of this ignorance? Why, that members will come wholly unprepared to do more than offer opinions instead of stating facts. We will suppose, for example, the paper bears some such title as this—"On the effect produced by the addition of a variety of bromides to collodion." It cannot be supposed that even the ablest chemist belonging to the society could pronounce a positive opinion on this subject, without having first repeated some experiments; consequently, we should hear, what we have often heard of late at the meetings—members expressing doubts whether the inferences drawn by the author of the paper were correct, when a simple experiment would have enabled them to state positively whether they were so or not.

We are supported by some of the most able members of the society in our opinion that it is not sufficient for the Council to accept any offer of a paper that may be made to them. This is not the proper way of inducing the best members to contribute—these want an invitation—they do not like to appear to thrust themselves forward; and, while they would willingly assist in promoting the advance of photography, they are reluctant to lay themselves open to the suspicion of being actuated by egotistical motives, which they think might result from their volunteering communications. Such would not be the construction we should put upon their doing this, nor do we think that others would do so, but this feeling exists, and should be recognised. The best method of obtaining papers from these members, it seems to us, would be to apply directly to them; as it would also in the case of those members who are too much occupied, or too idle, to voluntarily encounter labour, but who would not refuse a request, especially one which it would give them a certain degree of gratification to comply with.

It is not our province to instruct the society in the best way of managing its affairs, or it would not be difficult for us to show how it might be rendered of far greater service to the cause of photography than it has yet been. In truth, we often hear it asked, Of what use is the society? and, what good has it ever accomplished? and we find these questions difficult to answer. It is true it once appointed a committee to inquire into the theory and constitution of the photographic image on paper; and we believe a considerable sum of money—the income of the society being taken into account—was spent in experiments, but, so far as we are aware, it never made anything like a detailed report of these, nor the conclusions to which it led them, if we except a short and incomplete paper read at the meeting of the British Association at Aberdeen; yet the members of this committee were men as well qualified as any could be to carry out the inquiry. Again, many months ago, a committee was selected from among the members of the society and others, to test the relative merits of collodion manufactured by different individuals. The inquiry is one in which all photographers are interested, and a really good and impartial report would have been very valuable, yet no report has yet been made, nor is there, to all appearance, any likelihood that one ever will be made.

Let it not be supposed that we desire to depreciate the utility of having a photographic society; on the contrary, we have been induced to offer these remarks precisely because we feel that much good might be accomplished by it, provided its energies were properly directed. It ought to take the initiative in matters pertaining to photography, and to point out to members the direction in which it is desirable they should extend their observations.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

A rustic background, for variety sake, and to suit ladies and children, taken in out-door costume, may be painted in any dark brown or neutral tint, the outline being first laid in and marked out with Vandyke brown and strong size, and, when perfectly dry, the foliage and stone work shadowed out and strengthened as taste may direct. The same design, if preferred, might be painted on a frame or set piece; the

door hinged, so as to open and shut, that a figure might be taken sitting behind the same, or a full length, from the outside, with the hand on the door as if just about to enter the cottage. This, for elderly, rural dames, or old men, would give great and increased natural effect to the figures, and be more in keeping than the *old* "*one hand on the heart and the other on the pocket attitude*." A real birdcage and a bit of rural furniture would materially assist the completeness of the scene.

THE UNFORTUNATE PHOTOGRAPHER.

The photographic journals are very serious books. They certainly cannot be classed amongst the light literature of the day. On the contrary, there is much heavy reading in them; and they contain, perhaps, as awful an array of hard words as you will meet with in any book since the invention of printing. Imagine the young photographer, unacquainted

with chemistry and optics, dipping into one for the first time. What strange things he sees as he travels on through its pages! Atomic symbols, mysterious diagrams, and words of the most unpronounceable description, a perfect battery of which opens upon him on the very first page, quite startling him with its rough salute.

Determined to persevere, but a little stunned, he turns over leaf, and, shivering slightly as he passes the word "glycyrrhizine," gets on a little better for some short time. Suddenly he pulls up at a kind of gate across his path. This obstruction is formed by letters of the alphabet, figures, crosses, and other symbols, and presents an appearance something like this—$NO_3 + R_5 = O, A_2 + Dy_3$.

After surveying this remarkable object, and trying to spell it backwards and forwards, he, at last, fancies he arrives at its meaning; but disregarding the information it conveys, vaults lightly over it and proceeds with what follows. Not far, however; for now he pauses before a diagram with capital letters arranged at various points, and lines running in all possible directions. As a rule, these lines spread themselves out from points guarded by the capital letters, and his first and very natural impression is, that each of these letters represent a member of the police force with the ordinary bull's-eye lantern. On referring to the letterpress, however, for information, he finds that his attention is politely requested to the "conjugate foci" at A B, the "refraction of a ray of light" at C, and its "refrangibility" at D and E. And then he reads of "prisms" and "spectrums, chromatic and spherical aberrations," and is for some moments so belaboured by hard words that he stops, quite giddy about the head, and fears that *mental* aberration may possibly succeed this investigation of the spherical and chromatic aberration. So he takes a turn amongst the advertisements, thinking that he never saw so many rays of light about with such little illuminating power.

Becoming more refreshed by a cheerful perusal of the sizes and prices of photographic glass, and one or two other literary efforts of intelligent advertisers, he ventures to return once more to the page where he had left off, and resume his journey; but only to get a very short distance indeed, for, turning sharply over the leaf, he meets suddenly a something which "freezes his young blood," and fairly frightens him from advancing another step; for, stretched right across his path, like some huge antediluvian monster, coil upon coil, lies the word—

"Methylethylamylophenylammonium!"

Sympathising with our young friend, and believing that a page or two of lighter matter may not be unwelcome to older hands, let us endeavour, for their amusement, to sketch the character and relate some of the mishaps of the unfortunate photographer—the man "who never succeeds."

The unfortunate photographer has got capital apparatus, comfortable operating room, and means in abundance to follow successfully the practice of the art. He takes in and reads patiently all the books and journals published on the subject, being himself a large contributor to that portion of the latter devoted to "Correspondents," generally signing himself "Despair," "One out of Luck," or some such melancholy *nom de plume*. He not only reads the journals but faithfully believes everything therein written, and has tried nearly all that was ever recommended by their numerous contributors. The advertisers of fancy apparatus, unfailing receipts, and wonderful inventions, are sure to find in him a purchaser, as an almost unlimited number of useless articles on his shelves testify. He is somewhat inventive himself, and has originated several little things in the way of apparatus; amongst which may be mentioned the infallible portfolio, for changing six sensitive papers in the open air, and which, on the first trial, produced four pictures on two papers, and nothing on the others. The process of changing depends a good deal on the memory, and our photographer not possessing that organ largely developed, may, possibly, have led to this interesting result. The same defective memory often causes him to leave behind, especially on journeys, the most necessary articles. He has been known to forget to take that trifle, the lens, with him, and has discovered the slight omission when miles away from home.

Our unfortunate photographer has worked hard at the two great divisions of the dry processes—the culinary branch, as eggs, honey, gelatine; and the branch of the beverages, as raspberry vinegar, gin and water, &c. The latter process engaged his attention a good deal soon after that valuable discovery was given to the world; and he received much cheerful and generous assistance from his brother photographers, who kindly visited him about that time. As a rule, however, the "brethren" think him a bore, and do not seek his presence more than they can help, for he is constantly bewailing his misfortunes, and pouring into their ears his tale of woe. Alas! he was always unlucky! His productions suffer from all the ills the art is heir to. His prints are pale and sickly, or tinged with the deep hue of jaundice. His plates are spotted with small-pox and measles. Unwholesome "fogs" pervade the surface of his plates, which no amount of sunshine can penetrate in printing. His temper is tried by irritating "blisters;" while comets, stars, and shooting meteors dart portentously across his skies! Should some solitary plate escape all these evils, and turn out a good picture, that very plate is sure to be broken while all the rest are spared.

The Fates are always dead against our photographer when most he desires them to be propitious. Never, perhaps, did he invoke their aid more earnestly than once when he invited the object of his affections to have her portrait taken; for he is in love (perhaps that may have something to do with his blunders), and Angelina is for the first time to become the subject of a photograph by his own hand. Often has he "taken" his friends before, but never has he felt half the anxiety which now possesses him. His arrangements have been carefully made, his solutions fresh, and everything in order. And now the lady is seated opposite the camera, and he lingers under shelter of his black cloth, perhaps a little longer than simple focusing requires, gazing upon the fair face as it is reflected upon the screen, and hoping soon to fix the beautiful image imperishably upon his plates. Final arrangement of attitude being made, our photographer proceeds to prepare a sensitive plate, which is duly exposed and developed. It is found under-exposed, which causes his Angelina to look of an exceedingly dark complexion. Tries again. This time the result is encouraging, but expression not nice—it is not quite Angelina. He does not destroy it, however, but lays it aside to dry. The next plate, during preparation, slips off the dipper somehow, and disappears to the bottom of a large porcelain bath. After trying to fish it out, without success, he leaves it there. This is the beginning of trouble; for, after collodionising the next plate in the most successful manner, it drops off the holder—of course, with its face to the floor. At last, a plate is prepared, and the sitter arranged. The slide is placed in the camera, the shutter drawn up, the cap removed, the trembling seconds counted out; and not until putting down the shutter again does our nervous operator discover that having placed the slide in the camera the wrong way, the plate has been exposed outwards to the glaring sunshine instead of to the sitter.

Mortified at this mistake, he so firmly fixes his mind upon the slide that next time he neglects to remove the cap; and in a subsequent attempt, concentrating his whole energies upon the cap, he forgets to raise the shutter. So he is by this time getting warm, and a good deal excited, and his bottles of various solutions getting disarranged in his dark room, he mistakes one for the other—a mistake which results in vain attempts to develop with cyanide of potassium, to fix with iron, and in a general mixing of everything that

oughtn't to come together. One plate is particularly obstinate—it will *not* develop; but that is no wonder when it becomes clear to our photographer that he has been trying the powers of the solutions upon the back of the plate!

And Angelina sits again and again, and is *so* very sorry, and poutingly declares that she really believes this want of success is because she is not handsome enough. Now this little speech is made in the full expectation of being vehemently denied; and, indeed, it is a nice opening for a pretty little answer, but our confused photographer, with all his weight of care upon his soul, neglects to make the polite rejoinder. So the lady, a little piqued, and annoyed, too, at this moment (for our hero just then stumbles over her little dog, and, in doing so, deposits the dripping dark slide on her lap, thereby staining certain "breadths" of that "love" of a dress), says something about Augustus being "so very awkward;" which words, falling from lips so dear, do not by any means add to his comfortable sensations as he returns once more to his room.

During all this time, owing to some defect in the dipper, plates have been steadily accumulating at the bottom of his bath; and he finds it necessary, as it is almost full, to get them up before proceeding any further. In performing this operation—which is at all times an awkward thing to do—he coaxes them slowly up to the surface, not individually, but in a body—for they will all stick together—when, just as he is about to land them, they slip back again into the bath, and knock the bottom out; and forth from the fissure creeps the imprisoned fluid, meandering along the trough, down the waste pipe, and into the bowels of the earth! One insane attempt to stop its progress with his hands, and then with a cloth lying near, and our unlucky photographer collapses into a chair—on which chair there happens to be then lying a considerable quantity of glass plates. He scarcely notices the crash which follows—and, fortunately, does not *feel* it—but sits among the ruin gloomily. For all his toil there remains but one portrait—that one he laid aside to dry. He is thankful for *that* now, and reaches it carefully down from a shelf. Alas! there is scarcely a vestige of it left; for, having forgotten to wash after fixing, it now presents a crystalline appearance very beautiful to look at, but most annoyingly out of place—proving that a "thing of beauty" isn't always "a joy."

Hot, tired, and dispirited, our unfortunate photographer sits down again, and, in his abstraction of mind, seizes the cloth he had previously used for arresting the progress of the lost silver bath, and with it wipes the perspiration from his head and face. Emerging, after a short time, from his room into the sunshine, in the space of five minutes he becomes as black as the——Evil One! and screams of laughter from Angelina, mingled with entreaties that Augustus should there and then be "'taken' as Othello in plain clothes," conclude the performances of that unhappy day!

Our unfortunate photographer's experience with the "wet" process and "tents" would occupy too much room were we to relate it here. Would that we had time and space to tell, how, encamped in fields, and focusing with cloth-enveloped head, the angry bull has charged him in the rear, driven him ignominiously away, and laid his tent desolate! How, encamped by streams, and during some temporary absence, the rising tide has floated the little fabric slowly away on its bosom, and he has seen it no more! Or, on the breezy hill, whereon he pitched his tent, how the wind has made strange sport of it: and, with our photographer inside, has blown the whole construction about his ears. Pitiable spectacle! when, attracted by his cries (mingled with many naughty words which cannot be here repeated) the passing rustic has extricated him from the ruins—his hat driven firmly over his eyes, the brim resting upon his shoulders, and the chemicals overturned into his waistcoat, from whence, trickling coldly down the intervening portion of his anatomy, they drip slowly out at his boots!

Unfortunate, but ever-persevering photographer, may success come to thee at last!

Manchester. J. M.

The Amateur Mechanic.

GLASS—(*continued*).

Pipettes, Burettes, or *Dropping Bottles,* are frequently useful in a variety of chemical and photographic manipulations. These, of different forms, are easily made from glass tubes, when the experimentalist has acquired a little skill in glass working. A pipette of very simple construction, and very convenient in use, is shown in the margin. A piece of tube of any desired size is drawn to a capillary termination by the aid of gas or a spirit lamp, and a small ball or bottle of vulcanised india-rubber is secured by a ligature of silk to the other end. To use it, the india-rubber ball is compressed to the small end of the tube inserted into the liquid to be withdrawn; on allowing the ball to assume its proper shape, a portion of the fluid is drawn into the pipette, from which it may be again discharged in any desired quantity by slightly compressing the india-rubber ball, the amount of compression regulating the discharge.

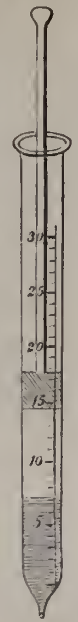
A form of dropping bottle, intended especially for adding nitrate of silver solution to the developing solution in the production of collodion negatives, is given by Mr. Hardwich, in his "Photographic Chemistry." Its shape is shown in the margin. On inclining it, the air passing in at the orifice in the side, causes the fluid to flow from the small aperture; the flow can be arrested and regulated by stopping the larger opening with the finger. Both apertures may be closed with corks when the bottle requires packing for travelling. To make this form of bottle from a tube will require a little skill and practice in glass working. A piece of tube three-quarters of an inch or an inch in diameter, should be closed and sealed at one end, as described in former chapters. The sealed end may then be heated and expanded by blowing, care being taken not to blow, if too thin. The other end may then be curved and drawn to a capillary termination; and an aperture formed in the side by directing a flame upon the spot with a blow-pipe, and then blowing it into a hole, as we have before described.

A burette for the same or similar purposes, may be more simply formed by taking a piece of tubing of any thickness that may be most convenient, and sealing it at one end in the usual manner. It should then be drawn to a capillary termination, and curved. The orifice at the point of curvature will be formed as just described. The form is shown in the annexed diagram. The rest or foot may be made of wood, or, what is, perhaps, better and more conveniently manipulated, gutta percha, which may easily be moulded to fit the tube. The mode of using this is similar to the preceding.

In many cases it will be found convenient to have pipettes or burettes graduated for accurate measurement, as it is known to most of our readers that drops do not represent any invariable or certain quantity, the measurement of a drop varying with the nature of the fluid; as few as twenty-four drops of some liquids, and as many as one hundred of others, being contained in a fluid drachm. Nor are the drops of the same liquid invariable in quantity, the size of the bottle and its aperture, and the mode of holding it, largely regulating the size of the drop. It is quite manifest, therefore, when accuracy of formula is important, that mere dropping without measurement is of little avail. The method of graduating glass measures we shall give in any early number.

For the careful withdrawal of any portion of a liquid without

disturbing it, and for a ready method of accurate measurement, a form of glass syringe, called Allsop's Minim Meter, is often of service. The form is shown in the margin. The diagram is graduated to thirty minims, or half a drachm, and shows a small portion of liquid drawn into the bottom, and a small space in the syringe between this and the end of the piston, which is the safest way of using it. To manage this, it is necessary to keep the packing of the piston moist with water, and have it fit well, so as to be air-tight. The piston then being withdrawn a little up the tube, the small aperture is placed in the liquid, and on a further withdrawal of the piston, a portion of the fluid is at once drawn into the tube, and the quantity required accurately measured. A stratum of air always intervening between the piston and the liquid, the former is always kept quite free from the fluid to be measured; the packing, which would otherwise become saturated with the fluid, is thus preserved from contact, and cleanliness is preserved.



One of these may be made from a piece of tube and a piece of glass rod, each of suitable dimensions; or a common glass syringe may be made to answer the purpose by the addition of suitable graduation.

Various other forms of pipettes, burettes, &c. may be made if required, but those we have described are simplest in construction and most convenient in use, and will, for the most part, answer the purposes for which such instruments are required.

(*To be continued.*)

Photographic Chemistry.

AMMONIA, NH_3.

Nitrogen combines with hydrogen to form ammonia. The two gases will combine in a gaseous state only after a vast number of electric sparks have been passed through the mixture; hence it is usual to prepare ammonia by causing the two gases to combine when they are in a *nascent state*—that is to say, at the moment when they are liberated in the solution. Animal substances, calcined in a vessel from which air is excluded, yield a considerable quantity of carbonate of ammonia; this is dissolved in hydrochloric acid, and is thus converted into hydrochlorate of ammonia, which is known in commerce as *sal-ammoniac*. To prepare ammoniacal gas, take one part of this salt, pulverise it, and mix it in a glass vessel with two parts of quicklime; chloride of calcium, water, and ammoniacal gas are formed; the water is absorbed by the excess of quicklime, which is a substance very greedy of moisture, and the gas passes over and can be collected in the usual manner, only it must be over mercury, as it is extremely soluble in water. The quantity of gas which cold water is capable of dissolving is estimated at 500 times its own volume; but it may be driven off by applying heat to the solution. A piece of ice dropped into a vessel containing this gas melts immediately, and, at the same time, dissolves the gas.

Ammoniacal gas is colourless, and has a strong, pungent odour; it is a very powerful alkali, and, from its being gaseous, it has been termed *the volatile alkali*. Litmus paper which has been reddened by an acid is restored to a blue colour by the action of ammonia, which neutralises the most energetic acids.

This gas may be liquefied under pressure or extreme cold; also by saturating pulverulent chloride of silver with the dry gas, putting this in a bent glass tube, open at one end, and then closing it hermetically. The end containing the chloride of silver is immersed in a vessel of water, which is heated gradually, until the chlorde of silver is entirely deprived of its ammonia, which passes over into the other end of the tube, which is buried in ice, where it liquefies. As the chloride cools, it reabsorbs the liquid, which gradually disappears.

If a porcelain tube be partly filled with iron or copper wire, and heated to a red heat, a current of ammoniacal gas passed through it will be partially decomposed, the metals absorbing a small quantity of nitrogen, and becoming very brittle; and it may be entirely decomposed by passing it through the same tube filled with quicklime.

100 parts of this gas mixed with the same quantity of hydrochloric acid gas combine and form a white powder, which is hydrochlorate of ammonia, or *sal-ammoniac*.

Ammonia cannot be ignited in the atmosphere; but if a thin jet be passed into a vessel filled with oxygen, and a light applied, it burns with a yellow flame.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 26th December, 1859.

M. Poitevin has published (*Bulletin de la Société Française*, Nov., 1859) a new process for obtaining direct positives. In the course of his photographic essays with gelatine, he observed frequently on developing the proof, that a negative image first made its appearance, and then a positive one far more intense than the former. These facts led him to establish the new process, which is based upon the following properties:—

1. A layer of iodide of silver in presence of nitrate of silver, after exposure to light, is blackened by pyrogallic acid.

2. The same layer, after exposure, being washed to eliminate the nitrate of silver, and covered in the dark with a dissolution of iodide of potassium, then washed again and covered with a solution of nitrate of silver, is again blackened by pyrogallic acid.

3. The action of light, even of very short duration, upon the preceding layer previously exposed and covered with iodide, prevents the colouration produced by pyrogallic acid.

The author adds that in all his experiments he has found an advantage in replacing acetic acid by lactic acid in the preparation of the pyrogallic bath.

I extract, from M. Robiquet's *Manuel*, the following interesting details on the crystallisable acetic acid employed in photography. This product, which is solid at low temperatures, melts at + 16° (centigrade); its odour is agreeable and penetrating. It boils at + 120° (centigrade), and its specific gravity = 2·09. At a temperature of + 18°, that is, in the liquid state, this acid, whose formula is $C_4H_3O_3,HO$, has a specific gravity = 1·063.

It is an energetic acid, mixing with water and alcohol in all proportions, forming, with the bases, a numerous series of salts, which are all soluble in water, and decomposable by heat.

All the crystallisable acetic acid of commerce is prepared from the rough product obtained by the distillation of wood. This distillation gives some very complex products, among which are observed carbonic acid, oxide of carbon, numerous hydro-carbons, water strongly impregnated with acetic acid, and, finally, methylic alcohol and the constituents of tar. This impure solution of acetic acid is known in commerce as pyroligneous acid. To obtain from it pure crystallisable acetic acid, the pyroligneous liquid is first saturated with chalk, pyrolignite of lime is thus obtained; it is decomposed by sulphate of soda with production of sulphate of lime, which is precipitated, and pyrolignite of soda, which remains in solution. This solution is evaporated to dryness, and the residue heated to 250° (centigrade), until all the tarry products are carbonised. The pyrolignite of soda is thus transformed into acetate of soda. The latter is decomposed in a distillation apparatus by four times its weight of sulphuric acid. The first one-third that passes over is put aside, as containing too much water. The two other thirds are kept; they contain a little sulphuric acid; they are purified by a new distillation over anhydrous acetate of soda. But the acid thus obtained is not at its maximum of concentration.

To obtain $C_4H_3O_3,HO$, that is, the monohydrated acid, the product obtained as above is submitted to an artificial cold produced with two parts of pounded ice and one part of common salt. Monohydrated acetic acid then crystallises, and the liquid portion is decanted off.

This perfectly pure product leaves no residue by evaporation; when dissolved in water, it does not precipitate by chloride of barium or nitrate of silver. If it contained sulphurous acid it would be discovered after boiling with nitric acid, by a precipitate obtained with chloride of barium.

M. Fréderic Pfaff, a distinguished German physicist, has lately made some very interesting experiments upon the modifications observed in the optical properties of crystals when submitted to great pressure. His memoir is published in *Poggendorff's Annalen* (vol. cvii. p. 333), and criticised in the December number of the *Annales de Physique et de Chimie* (1859). The apparatus used by the author is similar to that described in every treatise on physics, which is used to show that glass acquires double refraction when submitted to strong pressure; only the apparatus of M. Pfaff is constructed so that the compression may be exercised at will in two directions rectangular one to the other. A plate of quartz, seven millimètres thick, cut perpendicular to the axis, and compressed in a direction retangular to the axis, showed the following phenomena:—The circular rings produced by this plate with polarised light become first elliptic, elongating themselves in the direction of the pressure. An increase of pressure makes them take the form of the elliptic rings shown by crystals with two axes, and the focus of each of these rings is occupied by two small-coloured circles; the colours of these vary with the pressure which, at the same time, causes the focuses to become more distant the one from the other.

With calcareous spar, the phenomena are more complicated. When the pressure is not very considerable, the circular polarisation rings take the form of elongated ellipses—elongated perpendicularly to the direction of the compression, and the black cross, which in the ordinary state of things accompanies these rings, is decomposed into two hyperbolic branches, the summits of which are on the axis of the ellipses. If the pressure is increased as much as possible, the plate of spar undergoes, at a certain moment, a sort of instantaneous shock, and acquires optical properties, which perish after the compression has ceased to act; a phenomenon which shows that the plate has undergone a permanent molecular modification. The new properties thus acquired belong at the same time to crystals with two axes and to tempered glass, whilst the temperature and the homogeneity of the plate do not appear to have undergone the least modification.

MM. Demarquay and Ch. Leconte, after having studied the action of oxygen and azote upon the cellular tissue of animals, and showing that oxygen appears to lengthen the healing of sub-cutaneous wounds, that azote has no action in this respect, have just written to the Paris Academy of Sciences that carbonic acid has a very pronounced healing action. The authors have imagined some apparatus in caoutchouc, by which the wounded part is covered and plunged in an atmosphere of carbonic acid. This treatment appears to have been successful in cases of ulcer, diphtheritic wounds, &c.

On the surface of the moon are seen numerous streaks or narrow lines, about a hundred in number, which appear, perhaps, more like long narrow furrows than anything else. Sometimes they spread themselves on the lunar disc in straight lines, sometimes they are seen slightly curved; in every case they are shut in between stiff parallel borders. It has often been supposed that these furrows, the true nature of which has remained hitherto unknown, represent the beds of ancient dried-up rivers, or rivers that have not yet ceased to flow. Other astronomers think they are streams of lava which have been vomited by lunar volcanoes, and which reflect the light of the sun with more intensity than the adjacent regions. M. Schwabe, a German astronomer, endeavours, however, to give them another explanation. He has published in the *Astronomische Nachrichten* some facts which tend to show that these lines are the result of a vegetation on the surface of the moon. According to the author, if the surface of the moon be examined attentively with a good telescope and a proper illumination, we discover between the lines or luminous furrows of the high mountain called Tycho, and on different other points, a quantity of very delicate parallel lines of a greenish tint, which were not visible some months before the observation, and which disappear a few months after, to return again in the proper season. These lines, which are darker than the adjacent parts, are clearly the result of vegetation; and it is this vegetation which makes the sterile parts of the moon appear as bright luminous streaks. According to M. Schwabe, these lines of vegetation are more particularly visible in the very bright parts of the moon which are circumscribed by the mountains Hipparcus, Albategnius, Werner, Stoeffler, Maurolycus, Gemma-Frisius, Piccolomini, Catharina, Aboufeda, Regio-Montarius, Hell, Gauricus, Wurz-Elbauer, Heinsius, and Count Wilhem.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

After we had finished our ablutions we strolled up into the wood at the top of the hill to get an appetite for our breakfast. Here we found an old man busy pouring something from little earthenware vessels into a sort of pitcher; this we found to be varnish. The manner in which they get this is in this wise: they bore a hole into the heart of the tree and insert the end of a stout reed in it, which they cement round with clay. The reed projecting several inches from the body of the tree drops the gum which exudes through it into a basin placed there to receive it, which is carefully covered over by a piece of oiled paper to keep out water and other impurities. We followed the old man from tree to tree, and found that there were altogether thirteen varnish trees in this wood, and the quantity of varnish he collected from them must have been about three quarts. He told us that he did this for the mutual benefit of all who lived in the cottages, and that the right of collecting it was given to them by the agreement which they had made with respect to the cultivation of the hillside; but Dsetjuma would not believe him, as the value of the finest kind of varnish, such as this, was something considerable.

All the preparation it underwent, as far as I saw, was slow heating in a glazed earthenware vessel, the scum which formed on the surface being skimmed off and put aside; but it is well known that it seldom finds its way to market in this condition, its value rendering it too tempting an object for adulteration. As a varnish for negatives it is excellent, being transparent and hard, yet not hard enough to be brittle; and I was very glad to have this opportunity of buying a supply of a substance of which I stood greatly in need. To give some idea of the price demanded for this varnish when pure, I may state that I paid for about thirty ounces what in English money would amount to nine shillings, as nearly as possible, although I was told that this was not more than a third of what I must have paid if I had bought it in a city.

Breakfast had been waiting for us some time when we got back to the cottage, and we did ample justice to the delicate stews and the nice little hot cakes prepared for us; they are very clever in manufacturing these cakes, and I don't think I ever saw so great a variety anywhere, except in Brussels, nor any more pleasant to the palate. While we were eating our breakfast, the children from all the other cottages crowded into the apartment to see us eat — little naked urchins of both sexes, who seemed as devoid of fear or timidity as only such unsophisticated little creatures can be; not that they were offensively pert, but they were bold with

* Continued from vol. iii. p. 189.

the boldness which only lasts so long as they retain the purity and innocence of childhood. A good many of the cakes found their way into their hands, and it was a real pleasure to see how they enjoyed them. The men were in the field at work, and so were some of the women; but the presence of the children furnished an excuse for those who remained at home to come to the apartment where we were. They did not appear in the least tired by their exertions of the previous night, and from the way in which they replied to our compliments on the manner in which they had acquitted themselves, I don't think they would have required much persuasion to begin again; but we knew better than to ask such a thing; it was very well when we were resting from the fatigues of the day, but in the morning, when we were just going to begin them, it was quite a different thing. These women had not disfigured themselves in the manner in which it is a common practice for married women to do here: I mean, they had not blacked their teeth, or, if they had once done so, they had suffered it to wear off, for the only evidence I could see of their having once been black was in their being a little darker than those of the girls; but this might have arisen from other causes. One of the women had lost an ear, and had a deep scar from the collar-bone right across the chest. Dsetjuma asked her how she got it, and, with a good deal of embarrassment, she told him that her husband had done it in a fit of jealousy. I don't know what it was he replied to her, after she had finished this tale, but it had the effect of making her leave the room. I fancy that he, like a good many men in other countries, can be very severe on the subject of women's duties, without troubling himself to set them an example by his own conduct. We heard a rather different version of the affair when she had gone; according to which, she had made an appointment to meet a man at a certain place, and that this fact had come to her husband's knowledge, upon which he went to the place of rendezvous himself, drove away the man he found there, and when his wife came to the spot, he attempted to strike her across the head with his knife; but as she happened to move her head on one side, the stroke merely took off her ear, felt on her neck, and then glanced across her chest. This is the first instance I have heard of a man being jealous of a woman since I have been in Japan.

(*To be continued.*)

Proceedings of Societies.

North London Photographic Association.

The ordinary monthly meeting of the Association was held at Myddelton Hall, on Wednesday, the 30th ult.; George Shadbolt, Esq., V.P., in the chair.

After the usual business of the Association had been disposed of, Mr. G. W. Simpson read a paper *On the Positive Collodion Process*, with some remarks on the Alabastrine Process, illustrated by a large number of specimens.

A vote of thanks was given to Mr. G. W. Simpson for his interesting paper; and a discussion ensued on the permanency of pictures taken by the alabastrine process. Mr. Simpson informed the members that many of the specimens on the table had been taken more than three years; and during that time had been standing on a shelf unprotected by glass or case; and although exposed to atmospheric influence for so long a period, there was no perceptible change or deterioration in them. He thought this was a good test and proof of their permanancy.

Mr. Hughes wished to know whether the want of brilliancy in some of the coloured *non-inverted* pictures was a general result in this process.

Mr. Simpson considered that it arose from the *penetrating varnish* used when preparing the non-inverted pictures, slightly disturbing the powdery surface of the film, rendering it less radiative of the light than before its application: it was not always the case, it might arise from the fact of the original picture before the use of the alabastrine solution not being adapted for that process.

The next subject discussed, arising out of the paper that had been read, was the glass used for photographic purposes.

The Chairman stated that he had examined some of the glass mentioned by Mr. Wall and others at the late meeting of the South London Photographic Society, which, though very white and brilliant to the eye, did not as a rule admit of the production of negatives without either being fogged or stained. On looking at some samples in Messrs. Cotton and Wall's establishment, from the appearance presented, he was induced to examine the surface by the aid of a powerful lens, and found, as he had expected, that it was imperfectly polished, being covered with a number of minute depressions, each one forming a centre of chemical action.

Mr. Hughes stated that some time ago he had among his stock of glass a description that was exceedingly white, very smooth on one side, but hillocky, pimply, and rough on the other, he had taken some of his best pictures on this glass; it gave an exceedingly bright image with great depth of tone, and whenever he wanted to produce something extra good, he always selected this glass, but it was necessary to be very particular as to which side was coated with collodion.

Mr. A. Goslett had no doubt, from Mr. Hughes's description, that it was "crystal sheet;" it was of course necessary to use the right side, for if the uneven side were coated with collodion, it would produce a very unsatisfactory result. The best glass, in his opinion, was "*polished* flatted crown:" this is flatted crown polished by hand, but previously flattened by fire, which he explained was done by passing a hot iron over one side of it to reduce irregularities.

Mr. D. W. Hill always used patent plate, after losing many good negatives in flatted crown by breakage in the printing-frame.

The Chairman then directed attention to the next point of importance noticed in Mr. Simpson's paper, viz., the cleaning of glass. In his opinion, there was nothing better than old collodion.

Mr. Hughes remarked that the only objection was its unpleasant effect upon the eyes.

Mr. Simpson had used it, but thought the Tripoli mixture, the formula for making which he had given in his paper, was preferable.

The Chairman said, that with regard to the use of the methylated spirit in the collodion, he widely differed from Mr. Simpson, considering it highly injurious to the nitrate bath. Several members were of opinion that methylated spirit was extensively used in the manufacture of collodion.

Mr. Hughes said there was no difficulty in ascertaining whether such spirit were used; all that was necessary was to let a little collodion evaporate in the hand; the unmistakable smell of tar would remain when methyle had been used.

Mr. Simpson had examined a large number of collodions, and almost all contained methyle. A few makers were named whose collodion did not contain it.

With regard to the method of iodising the positive nitrate bath, the Chairman said that the method adopted by Mr. Simpson was, in his opinion, decidedly the best (that of leaving in the bath for some time a plate coated with the collodion to be used), as the bath thereby obtained not a simple iodide only, but a first dose of the other salts with which the collodion was sensitised, so essential to the production of a good picture.

A discussion then arose relative to iron developers.

Mr. Hughes and Mr. Simpson were both of opinion that the addition of sulphuric acid to the developer, especially when acetic acid was also used, produced a dead flat picture, or one covered with silver spangles—in fact, it had all the disadvantages of nitric acid, without any of its counterbalancing advantages.

Mr. D. W. Hill stated that a friend of his had produced some excellent pictures by development with formic instead of citric acid.

Mr. Wall also stated the same fact; but the general opinion was that these good results were merely accidental, and produced in spite of its presence—formic acid having a tendency to fog and produce dirty pictures.

Mr. D. W. Hill had also seen good positives developed with protosulphate of iron, without the addition of any acid.

Mr. Simpson had in his paper remarked that he thought the beneficial effects of bromides had not been noticed.

Mr. Hughes stated that he believed he had first called the

attention of Mr. Hardwich to the advantages derived from its use, and in the course of experiments he found there is a tendency in bromide, in certain conditions of the collodion, to greatly influence and modify the effects of iodide.

The Chairman exhibited a number of stereoscopic pictures of China, published by Negretti and Zambra, and a remarkable picture of the spire of Salisbury Cathedral, by Mr. Sedgfield, which appeared horribly distorted in looking at it in the usual position of the stereoscope, owing to excessive "cocking up" of the camera; but on changing its position and looking upwards, the picture assumed a natural appearance.

The Chairman also exhibited several stereoscopic sunset pictures, by G. W. Wilson, of Aberdeen, with the sun directly in front of the camera—a position in which it has been hitherto considered impossible to take a good impression. These proofs were very much admired for their brilliant and artistic effect. In addition to the above, he exhibited a small print, on paper, by Mr. Church, of Glasgow, prepared six weeks ago, and kept in a case similar in principle to that of Messrs. Marion and Co.

A copy of the Presentation Photograph for the present year was handed round: the subject "Tintern Abbey," by Bedford. This elicited general approbation, and a vote of thanks was given to the gentlemen of the sub-committee for the good taste and judgment displayed by them in the selection.

Mr. D. W. Hill exhibited a picture taken by the Fothergill process, with the addition of one grain phosphate of ammonia to the ounce of albumen solution.

Mr. Wall kindly presented a stereoscopic picture of the costly bedstead lately presented to the Queen, for which the thanks of the meeting were accorded to him.

Captain Higginson and Mr. Henry Squire were duly elected members of the association.

Two of Mr. Moginie's tents were erected in the room for exhibition—one a tent only, the other camera and tent combined, weighing only 9 lbs. They attracted a considerable share of attention, and, long after the meeting had closed, many of the members were discussing the merits of both.

The meeting then adjourned.

Blackheath Photographic Society.

The twentieth ordinary meeting of this Society was held on Monday, the 19th instant, at the Golf Club-house; the President, J. Glaisher, F.R.S., in the chair.

The minutes of the last meeting were read and confirmed.

Mr. Heisch called the attention of members to the great intensity produced by the use of salts of magnesium as iodisers for collodion, and exhibited some negatives showing the effect of various iodisers on the same collodion. He stated his belief that salts of magnesium would be principally found useful in copying prints, and such subjects as required decided blacks and whites, but would give too great intensity to produce good effects in an ordinary landscape collodion.

Mr. Melhuish exhibited a stereoscopic camera patented by him, in brass, electro-plated, presenting the features of unusual lightness for strength and portability—seven dark slides and the focusing screen packing inside the camera, which was fitted with a leather case.

Mr. R. P. Napper was elected a member of the Society.

The French Photographic Society.

This Society continues its modest labours, and its members pass very interesting evenings in each other's society; we give a hasty *résumé* of what took place at the last sitting. First of all, some very valuable additions were made to the Society by the unanimous election of M. Fremy, of the *Academie des Sciences;* M. Ravaisson, of the *Academie des Inscriptions et Belles Lettres;* M. Levinski, who has quitted St. Petersburg, to take up his abode in Paris; and M. Arthur Chevalier, the son of the late able optician.

M. Jeanrenaud presented a number of very fine prints to the society, the greater part of them from negatives taken in the Pyrenees, in the neighbourhood of Cauterets, which struck us, by the vigour of their tones, the brilliancy of the whites, and the purity of the blacks. The same views were selected by M. Civiale, jun., but his negatives were taken on paper by the Talbot process, while Jeanrenaud operated with collodion. These two reproductions of picturesque landscapes, taken by two different processes, are both very beautiful; but though substantially alike, they differ so considerably in appearance, that we have some difficulty in believing that they are the same tableaux; between the two we should hesitate long in deciding which we prefer, but, on the whole, we think the paper of M. Civiale the best.

M. Dalligny presented a series of portraits of favourite actors; and even the grave countenance of the President relaxed at the sight of the comical physiognomy of Ravel. These portraits, which are remarkable for their truth and vigorous tone, were developed by a new process, which M. Dalligny will make known at an early meeting.

Dr. Valtier, who practises the therapeutic art as well as the photographic, pointed out at a previous sitting a really extraordinary photogenic anomaly. He had had a negative sent him from Shanghai, in China, so much altered that it was impossible to distinguish the distinctive features of the model; from this negative, M. Valtier had printed a positive, and he was greatly surprised to find in the positive details which to all appearance were completely wanting in the negative. The cause of this was a mystery to him, and he asked for an explanation from the chemists of the Photographic Society. The desired explanation was not long in coming. MM. Davanne and Girard explain it thus:—That which had disappeared from the negative were the blacks, formed, according to the French theory, of almost pure metallic silver; and the blacks had faded because the metal had metamorphosed itself into yellowish sulphite of silver. Under this new form the blacks were scarcely visible to the naked eye; they had lost, if we may so express ourselves, their visual opacity, but had retained their chemical opacity, in this sense that the rays of light which passed through were deprived of their photogenic action, or rendered as incapable of producing an effect on the sensitised surface of the paper as the yellow rays of the spectrum, the action of which is almost *nil*. That which to the eye was no longer a screen, was a perfect screen as far as the sensitised paper was concerned; hence the reason why the positive proof had appeared with details which, to all appearance, had vanished for ever. Everybody knows how cruelly the red spots on a man's face reproduce themselves in the photographic positive in the form of black spots, because their photogenic action is *nil*, or very nearly so; the blacks which in M. Valtier's print had passed to a yellow, acted like these freckles; absent on the negative, they gave very perceptible evidence of their presence on the positive.

MM. Davanne and Girard, in continuing their long examination of positive proofs, have now entered upon the important chapter of fixing, and the action exercised by the fixing agents on the colouring substances of the proof, that which produces the shadows, especially that which constitutes the half-tones. The principal fixing agents are three in number: the cyanide of potassium and iron, ammonia, and the hyposulphite of soda; the colouring matters of the proof are: metallic silver and the metallico-organic compounds of silver.

As a general rule, the double cyanide causes the positives to fade, and eats into the blacks and half-tones; ammonia augments the intensity of the shadows and half-tones; hyposulphite of soda produces no apparent effect; it neither augments nor diminishes the intensity of the dark parts, but it was necessary to penetrate more deeply, and to render evident, by experiments, the veritable and theoretical action of these three agents. The double cyanide and ammonia were employed in concentrated solutions; the hyposulphite in a solution at ten per cent. From numerous experiments which they made, these two able chemists draw the following conclusions:—The double cyanide dissolves pretty promptly the two colouring matters, but its action is much less energetic on the organo-metallic salts than it is on silver, which it eats into with considerable rapidity; the use of a cyanide bath is therefore very dangerous; it must only be used with great precautions, and it is only at times that it is useful, because in fixing the proof it leaves the whites of dazzling brilliancy.

Ammonia, even after having been used for a long time in fixing, undergoes no sensible chemical alteration; it does not sensibly dissolve metallic silver, or the organo-metallic salts, but with lime, and consequent on its action on the free nitrates or chlorides, it assumes a yellow colour, and the matter in suspension which gives this colour to it, is precipitated on the whites and soils them; at the same time, the mixture becomes

more and more powerless in determining a perfect fixing. This weakness will become more and more evident with the lapse of time by the transformation of a part of the silver of the blacks and half-tones into yellow sulphide of silver; moreover, the size in positive papers adds much to the bad effects of the ammonia, so that it cannot be relied upon as a certain and efficacious fixing agent.

The hyposulphite of soda acts on the free nitrate and chloride of silver to convert them into double hyposulphites of soda and silver; this double hyposulphite dissolves in hyposulphite of soda in excess, and consequently the fixing action of the bath continues in excellent condition so long as the bath has not reached the point of saturation, so long as the bath contains free hyposulphite, so long as it is fresh; but when it is saturated or has become old, and the double hyposulphite of soda and silver can no longer find free hyposulphite of soda which can dissolve it, it no longer acts on the nitrate and chloride of silver, which remains free on the surface of the positive, its fixing action is incomplete, and it is absolutely necessary that it should be replaced by a new bath. In a forthcoming communication, MM. Davanne and Girard will show how the number of positive proofs may be determined *à priori* which a given hyposulphite of soda bath is capable of fixing, without reaching the degree of saturation, which will impede the fixing, and thus teach how to fix the proof with hyposulphite of soda in a perfect manner.

M. Titus Albites, a distinguished sculptor, who passes his leisure time in the practice of photography, which he also uses to assist him in working with the chisel, exhibited and described an apparatus of his invention, by means of which he can perform all photographic manipulations without a travelling tent, or a portable dark room. In support of the justly-merited eulogies which he accords to his laboratory, M. Albites presented some really remarkable negatives and positives taken by him in all sorts of places, with as much facilty and success as if he had operated with all the conveniences to be found in Legray's or Disderi's ateliers. To give an idea of the new apparatus, it will be sufficient for us to say that it consists of a camera resting on a close box, containing the dish with the nitrate of silver; a dish filled with distilled water; a dish with the proto-sulphate of iron serving as the developing bath; and, if need be, if it be desired to develop with pyrogallic acid, a sort of portfolio, one side of which is formed of yellow transparent glass. There are no frames for the support of the ground glass and the collodionised plate; the ground glass is applied directly against the bottom of the camera, and is replaced by the collodionised plate when operating. This plate is attached to a sliding frame, which is itself attached to a chain, which lowers or raises it by the operator simply turning a handle in this or that direction, so as to cause the plate to plunge into the aceto-nitrate bath, the developing bath or the water, or into the bath of gallic or pyrogallic acid, which is in the portfolio. After M. Albitès has let his collodionised plate remain a sufficient time in the nitrate bath, he exposes and washes it, by dropping it up or down in the water, &c.

In all the tests to which the inventor has submitted his apparatus, he has found it to answer so well, that he thinks it capable of superseding the necessity of having laboratories as at present, to the great advantage of the photographer in a pecuniary point of view, and also on the score of its convenience.

Mr. Thompson showed how Woodward's apparatus for enlarging positives could be adapted to dark rooms.—*Cosmos.*

Miscellaneous.

* * * Yet, in truth, one is tempted to pause for a moment to call attention to the strange power with which we are here dealing. When we think of that subtle radiation, that vibration trembling along the far regions of space, with a swiftness measured by nearly 200,000 miles in a second, and with a tremulous motion whose pulses in the air vary from 16,000,000ths to 26,000,000ths of an inch in length—when we think of this, pulsation as a motion, not as a transmission of a material essence, as the handing on of a mere passing movement from particle to particle of an elastic, all-feeling, subtle form of matter, like the swaying of a crowd to and fro in some densely packed avenue—when one thus thinks of this subtle influence, light, one is indeed lost in wonder before the complexity of the results it produces, and the infinite variety of blessings that that rapid little motion brings to us. For is it not the feeding influence of all life, the very nerve-force of this universe? . . . . When we think that radiant heat, that visible light with its ten thousand lovely hues, that chemical agencies of so subtle a kind, that while the chemist uses them he vainly tries to simulate them in the processes of his laboratory, are all but phases of this one vibration—are, in fact, but expressions of its greater or less rapidity of vibration—one may well feel overwhelmed with the view opened up to us by this one glance into one series of the marvels of this most intricate universe.—*National Review.*

The Pseudodiascope.—At a recent meeting of the Manchester Philosophical Society, Mr. F. O. Ward laid before the Society an instrument termed a "Pseudodiascope," and read a paper, setting forth its construction and use, and the principle it is designed to illustrate. By means of this instrument an aperture transmitting light is made to produce on one eye an isolated impression, while the other eye is directed to an opaque body, such as the hand held before it. The image of the aperture is then found to be transposed, and its perception ceases to be assigned to the eye by which it is really seen; the effect being, that a perforation appears in the opaque body, through which the light seems to shine upon the eye by which this is viewed. The principle illustrated by this instrument, according to the author's view, is the essentially goniometrical and deductive nature of the visual act, whenever the distances of bodies are perceived, and their relative positions in space assigned. A "Pseudodiascope" was presented to the Society by the author, and the singular illusion produced by it was verified by the members present.—*Athenæum.*

Photographic Notes and Queries.

THE COLLODIO-ALBUMEN PROCESS.

Sir,—Much has been written on the collodio-albumen process; to me, it is the most simple and certain of any for out-door work, and I think the reason why people fail is a want of cleanliness and too short an exposure. Plates prepared by the following rule will keep good six months or more, and, after excited, will remain sensitive two or three weeks, if kept dry and free from light. Thoroughly clean the glass; coat them with good old positive collodion—the latter bears more washing than negative; in fact, positive is best, as it is tougher, less liable to blister or stain. Immerse in an ordinary positive bath for two minutes; take out, and wash well with common water, and finish with distilled. Stand to drain; coat again twice with iodised albumen, made thus:—

White of egg	1 ounce.
Water	½ "
Iodide of potassium	3 grains.
Bromide	3 "
Glacial acetic acid	8 drops.

Stand to dry—the quicker this is done the better. When wanted, excite them in an acid bath, 40grs. of silver; glacial acetic acid, ½drm. to each oz. of water; wash again, as before, and pack away to dry. Expose from three to six minutes—the latter with a landscape lens—or even more. Most dry plates are under exposed, causing a chalky or snowy appearance. To develop, moisten the plate with distilled water, and develop with

Pyrogallic acid	3 grains.
Citric acid	1½ "

Bath solution, 8 drops to the oz., using fresh as it gets discoloured; fix with hypo. H. Goble.

MR. MELHUISH'S PRINTING PROCESS.

Sir,—In a previous number, Mr. Melhuish says he uses either of two baths for toning; in both he "washes" the print before placing it in the bath; in one bath he uses silver. I do not see the utility of washing the print, if silver is to be employed afterwards, as the object is to get

rid of the silver; but why wash at all? it is quite a new idea; of what use is it? I have toned and fixed hundreds of prints, and never washed one of them, and the results have always been good. Will you, then, kindly oblige me by saying whether or no washing the print is actually essential, and for what purpose? In Mr. Melhuish's second bath, he fixes in hypo. after all is over. What effect has the hypo. on a print after toning in the gold and soda bath? In several I have toned, the hypo. caused no alteration whatever; if it is not used, what would be the result to the print? I trust you will kindly excuse this trouble; my object is, to endeavour to simplify the process as much as possible; and if, by a little gold, and soda (carbonate), and water, a good print can be obtained (as I have), of a fine violet hue, what use in washing and fixing in hypo.? and I beg to thank Mr. M. for his valuable paper, and to say that I have got some beautifully-toned prints by using his bath, but without the preliminary of washing, and without the hypo. As yet no alteration has taken place in the prints, and they are equally as good as those which have been subsequently fixed with hypo. I am speaking particularly of bath No. 2 (I have not tried bath No. 1), in that he fixes after working; then tones in what appears the "old toning" bath, which, after all, is, perhaps, as good, if not better, than many of the numerous modern ones. I know a photographer who never uses any other, and has a large dish in the corner of his glass house, into which he pitches, direct from the frame, print after print, and occasionally stirs up and adds gold and hypo., and it is as black as ink when he stirs it up, and he keeps it so for months—his prints are first-rate. SUBSCRIBER.

ROUGHNESS OF THE FILM.

SIR,—Your correspondent "W." is not the only one who has suffered from roughness of the collodion film; yet he is the only one I have ever had the opportunity of sympathising with, in regard to the almost total disappearance of the picture behind a blue film on drying—this blueness being often slightly perceptible, even whilst wet. Varnish will entirely remove it, and so will intense heat.

The collodion I used, when in "W.'s" fix, was made by ———, who supply, gratis, a formula for a developer best adapted to its use; which, in justice to the manufacturers, I must say I never but once employed, forgetting, at this moment, with what result, since it is now eighteen months ago; yet it is probable I should have tried it again had I found relief.

I, probably, should have thought no more about it, had I not seen "W.'s" letter; and had it not been that, about a fortnight ago, I was under the necessity of using the same maker's collodion, with exactly the same result, to my great annoyance and inconvenience.

The "ground-glass film" "W." speaks of is a reticulation, caused by the use of impure alcohol or ether in the collodion.

Our complaints, I have no doubt, are identical; and, unless you can assist your correspondent more than I, it is to be feared that his "disinclination to throw what he has away" will have to yield to the picture behind the screen.
C. CRAIG.

DRY COLLODION DIFFICULTIES.

SIR,—I have just noticed in Mr. Ackland's paper on the "Difficulties of the Dry Collodion Process," read before the South London Society, the following:—

"BLISTERING.—This defect seldom occurs in working Fothergill's process, but is often observed in the collodio-albumen, gelatine, and oxymel processes," &c.

Now, as one fact is generally admitted to be worth a considerable number of assertions, it may be well to state that having used, during the last year or two, nearly 2,000 of Dr. Norris's dry *gelatine* plates, I have not had one negative *spoilt*, and but two or three injured by "blistering." I may further add, that, out of the ten difficulties which Mr. A. appears to have met with in his dry-plate experience, I have only noticed, with the *gelatine* plates, "pin holes in the high lights;" and this I now prevent by dusting the film, before exposure, with a camel's-hair brush or piece of cotton-wool.

Mr. Ackland's suggestion, of varnishing the edge of the film to prevent it peeling off, is valuable; had it reached me some years back, I might have been spared much trouble.
A. J. MELHUISH.

GUTTA-PERCHA BATHS AND DIPPERS.

SIR,—Some nine months or so since, I bought a 9×7 gutta-percha bath and dipper for a portable tent, and, after well cleansing it, as recommended in the "PHOTOGRAPHIC NEWS," have used it more or less since, and now I feel convinced that the gutta percha has an injurious action on the nitrate silver solution. The dipper soon spoiled a 22 oz. bath; an iron strip being inclosed in the centre, it got encrusted with something very like metallic silver, part of which I inclose for your inspection. The bath itself is covered with a white deposit, and a scum forms on the surface of the solution, if it is left in one night only. Both the articles have the stamp of the Gutta Percha Company on them. Glass baths are alone to be relied on. T. GULLIVER.

PURIFYING A NITRATE BATH FROM ORGANIC MATTER.

SIR,—Can any of your correspondents inform me, through the medium of the "PHOTOGRAPHIC NEWS," what they consider the best mode of purifying a nitrate bath, supposing it to be mixed with a small quantity of organic matter, such as gelatine or albumen? S.

BLISTERS IN THE COLLODIO-ALBUMEN PROCESS.

SIR,—In the paper read by Mr. Ackland before the South London Society, he gives a great many causes for the blisters in Taupenot's process, and remedies for them. I believe, if very thin collodion be used, and the plates put *quite warm* into the aceto-nitrate bath, blisters will never occur.
H. M.

TO CORRESPONDENTS.

J. H. W.—Aluminium, though it had long been suspected to be the metallic base of alumina or clay, was first separated by Wohler, a German chemist, in 1827. He, however, only succeeded in producing it as a grey metallic powder; and M. Deville, of Paris, was the first who obtained it, in 1854, in metallic masses so that it could be wrought. Like all the metals, it is a simple substance, and has no "component parts." It has the characteristic property of the precious metals; that is, it is not readily oxydised or rusted, and is more calculated to supersede silver than any other of the metals. Common clay is the ore of aluminium, the metal constituting about one-fourth of the clay. It is also one of the constituents of all the alums.

AN EXPERIMENTALIST.—Six cubic inches are about equal to 3½ ounces. The same quantity of alcohol should have sixty grains of iodide dissolved in it. 2 per cent. is equal to 9·6 grains per ounce. 40 cubic centimètres are about equal to 1⅓ ounces; and 60 cubic centimètres to 2 ounces and 1 drachm. 4 cubic centimètres are a little over 1 drachm. Take 1 grain of citric acid, instead of 1 drachm of acetic acid. All the above information may be obtained in our "Photographic News Almanac."

J. C. B.—Our correspondent's eight queries respecting the oxy-hydrogen light cannot be answered, in the form in which they are put. He should ascertain from some elementary book what is the principle upon which the light is obtained, and the kind of apparatus required. It is the same as the lime light, and can be employed for night photography.

FOTOGRAF.—The two lenses are evidently not fitted for working together in a twin camera; and, from your description, we should imagine that they are both very inferior. The other matters are attended to.

S.—Our correspondent's letter on the new plate-box has arrived, but not the diagram which is referred to in it.

J. L. F.—1. We are not certain, but we think by the wet collodion process. 2. A pair of single aplanatic lenses.

G. P.—We think they are published by Negretti and Zambra, Hatton Garden.

F. HOWARD.—Received.

Communication declined with thanks.—Stromenos.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—P. Q. R.—Follow.

IN TYPE:—T. G. F.—R.—H. R. R.—W. May.—Prideaux.—H. M.—G. H. W.—Oxoniensis.—Half-pay Major.—Joseph Bell.

⁎ All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 70.—*January 6, 1860.*

The evening when the meeting of the Photographic Society was appointed to take place, being so very near to the day when we prepared to send our last number to the press, it was natural for us to assume that, as we had received no copy of the paper to be read on the occasion, none would be issued; we therefore considered ourselves bound, for the interest of the members, to call attention to the circumstance, involving as it did a breach of promise. It happened, however, that, after our paper had gone to press, we received a proof of the communication which Mr. Hardwich proposed to make to the society on Tuesday evening; we therefore feel ourselves bound to state that our suggestion *has* been carried into effect, and we hope that the members, being now able to study the papers to be read at their leisure, may come to the meetings prepared to combat or verify the statements they may contain, with a perfect knowledge of the subject to be treated of. One good result was manifested at the recent meeting, in the fact that several of the leading members, who have absented themselves hitherto, were present, and the discussion was altogether more interesting than usual.

PRINTING AND TONING ON ALBUMENISED PAPER.

It would appear that many of your correspondents who have used the printing process detailed by "Theta" (vol. ii. p. 16) regard him as the author of it. This, however, is not the case, nor does "Theta" himself lay any claim to the invention. Indeed, the whole process, with the exception of the toning bath, was published in 1854, by Mr. Sutton, of Jersey, and it may be found in both editions of his work on the calotype process, the first of which bears the date of March, 1855. It is well known that Mr. Sutton is the author of the *sel d'or* toning process—a vast improvement on the processes which were in use prior to its publication; but, as albumenised paper had then been recently invented, it became the rage, and *sel d'or* (which was adapted for plain paper only) was given up for a hypo. bath, to which acid chloride of gold was added, and in which albumenised paper could be toned. Most of the prints toned in this way have faded, while those toned by the *sel d'or* process have generally stood well, and retained their freshness. The author of toning by chloride of gold and hydrochloric acid was M. Le Gray, of Paris. The hydrochloric acid was, after some experience, omitted, its effects being injurious to the permanency of the prints, which soon exhibited unmistakable signs of fading. The usual terchloride was then employed, but still acid with excess of hydrochloric acid, in conjunction with a bath of hyposulphite of soda. Many modifications of this mode of toning have been published, but, owing to a cause no one could find out or explain, the process was far from satisfactory. At length it occurred to some one to neutralise the hydrochloric acid in the terchloride of gold, and make *an alkaline instead of an acid toning bath.* The idea was put into practice, and succeeded beyond expectation. Who it was first hit on this notion is not certainly known, but it seems it had been in private use for two or three years before the public knew anything about it, and I understand that Mr. Francis, of Great Russell Street, London, claims the invention. If so, it is a pity he did not publish his discovery. It appears also that Mr. Waterhouse, of Halifax, was an independent discoverer of the advantages of employing an *alkaline* instead of an *acid* gold bath. He, too, kept the matter a secret, until the printing committee of the Photographic Society was appointed, when he forwarded to the committee some prints to be tested, and, at the same time, communicated his method of toning them. "Finding (said he) that Le Gray's process eats into the picture, I modify it by using an alkaline instead of an acid solution of gold. The alkali I employ is the potassæ subcarb., and I add more or less of it, according to the tint desired." Mr. Hardwich suggested the use of carbonate of soda instead of carbonate of potash, not because it is better, but for the reason that it is more easily obtainable; and at the meeting of the London Photographic Society, in December, 1858, he read a paper on "Toning by Alkaline Chloride of Gold," expressly stating that it was founded on Mr. Waterhouse's modification—the value and importance of which he fully recognised.

In February last, Mr. Maxwell Lyte sent to the French Photographic Society an account of a new gold-toning process which he had adopted, and which will be found at p. 301 of the first volume of the "Photographic News." Mr. Sutton has, since that time, published a printing process for albumenised paper, containing some important modifications. As all these systems proceed on precisely the same principles, which are now admitted to be the only correct ones, I have taken the trouble to compare and consolidate them for my own use, and I now forward them to you for publication, should you think them likely to be acceptable to your readers.

ALBUMENISED PAPER-PRINTING PROCESS.

1. *To Albumenise the Paper.*—Beat up to a stiff froth equal parts of white of egg and water, containing 15 grains of salt and 1 minim glacial acetic acid to each ounce. When sufficiently settled, filter into a flat dish. Float plain paper on this for half a minute, and hang up to dry quickly in a warm room. If less salt than the above is used, the prints are liable to turn red in the hypo. fixing bath.

2. *To Sensitise the Paper.*—This is usually done by floating it on a 60 grain bath of crystallised nitrate of silver. Mr. Melhuish, in his paper on this subject (*suprà*, p. 153), recommends a bath of 75 grains, and Mr. Sutton has expressed his entire approval of this change, as it produces more brilliant prints. Float the paper for two minutes only on the stronger bath, taking care that the solution does not sink into the paper. If it does, remove it immediately. If floated too long, a dull print will be the certain result; therefore excite quickly, and dry quickly.—N.B. It has been recommended to add one drop of nitric acid to every drachm of sensitising bath, and it is said that this addition will preserve the paper without discoloration for six weeks after sensitising. Should this not be adopted, it will be advisable to add one grain of citric acid to each ounce of bath, to insure red and brilliant prints.

3. *The Exposure.*—Print rather deep. On taking the proof from the frame, it should look vigorous and clean, or no toning process will make it so; neither can a vigorous print be obtained from a feeble negative. The proof must not be exposed to daylight, and the subsequent operations must be conducted in the dark room, or by yellow light only.

4. *To Wash the Free Nitrate of Silver from the Proof.*—Place it in a flat dish containing a small quantity of water, just enough to cover the print, and let it remain five

minutes, or longer. Then pour off the water into a jug, and pour it from the jug over the surface of the print. Repeat this six or eight times; then throw the water into a large pan containing salt, which will in a few hours precipitate the silver in the form of insoluble white chloride of that metal. By this treatment, 95 per cent. of the silver in the print may be saved. The print must now be finally washed well under a tap, and, if all the free nitrate be thus removed, may be at once immersed in the gold bath. If, however, free nitrate be left on the print, it will injure the gold bath by throwing down chloride of silver and metallic gold. To prevent this, Mr. Sutton formerly prescribed immersion in a bath of water containing a few drops of ammonia. He does not now advise this course. The simplest form is to use a bath of salt and water, containing a quarter of an ounce of salt to the pint. Leave the proof in this for 3 to 5 minutes, and it may then be transferred to the gold bath without washing.

5. *The Gold-toning Bath.*—This bath consists of 1 drachm of a solution of auro-chloride of sodium in 4 ounces of clean filtered water. This quantity will tone a whole sheet of Canson's or Marion's paper, or even more. If, however, 4 ounces will tone 16 stereo. prints, each print will require 2 drachms of the bath. No more solution must be used than is actually necessary for the print or prints to be toned. If it be wished to tone only one stereo. print, pour 2 drachms into the flat dish, and add 2 drachms water, to cover the paper. The quantity used for one print may be used for another. If it becomes turbid, filter it; but when the gold in it is exhausted, throw it away, and use fresh. On no account must fresh chloride of gold be added to strengthen the solution that has been used, as by so doing the subsequent proofs immersed in it become intensely yellow, and consequently worthless.

The auro-chloride of sodium solution is made by dissolving 15 grains of chloride of gold in 10 drachms of water, and then adding 15 grains bicarbonate of soda, dissolved in 5 drachms distilled water. Do not exceed this quantity of carbonate of soda, or the excess will act injuriously on the organic part of the silver image, and also loosen or dissolve the size in the paper. Phosphate of soda is not open to this objection, and may therefore be added to the bath, at the rate of 15 or 20 grains phosphate to every grain of auro-chloride of sodium, *i.e.*, to every 4 ounces of bath.

The proof, on immersion in the toning bath, quickly assumes the purple hue conferred by gold, and must be removed before it becomes black, and while there is a tinge of redness in it, as it afterwards does not look so red as when in the bath. About a minute will be generally long enough when the solution is fresh.

On removal from the bath, wash the print well in several changes of water before placing it in the hypo. This is important, and should not be neglected.

6. *To Fix the Print.*—This is done by immersion in a solution of hyposulphite of soda, 3 ounces to the pint of water. Test the solution for acidity, and neutralise it by adding a small quantity of chalk, or carbonate of lime, but not carbonate of soda. Although the hypo. bath must not be acid, neither must it be too decidedly alkaline, or it will injure the purple tone conferred by the gold. English papers are more liable than foreign ones to become red in the fixing-bath. When the print has been in the hypo. 10 or 15 minutes, hold it up to the light, and, if it be transparent all over, the chloride of silver is dissolved out of the papers If not, put it back again, till the opaque parts have become transparent; then remove it, and wash it under a tap for several minutes, after which, place it in running water for three or four hours. Or, to expedite the process, adopt the method of Mr. Warwick (vol. i., p. 227), or that recommended at p. 71 of vol. ii., both of which may be combined with advantage. After undergoing this or the usual treatment, the print is dried and mounted.

It must be added that the hypo. used for one printing should not be employed for a second, and that it will be advisable to put aside a bath after a dozen prints have been fixed in it, and use fresh solution for any remaining proofs that are to be fixed. This being the case, no greater quantity should be used at a time than is necessary to cover the prints which are immersed in it.

The preceding mode of printing is not only in every respect superior to that employed by "Theta," but shows that his toning-bath, containing from 20 to 30 grains of carbonate of soda to each grain of chloride of gold, is wrong in principle and injurious in practice, and ought, therefore, to be given up. Those who employ the process here given, manipulating carefully, and doing the various washings efficiently, may calculate on brilliant prints, of first-rate quality, the permanency of which may be confidently predicted. R.

HOW TO MAKE AN OLD-FASHIONED CARVED CHAIR.

As old carved furniture comes out well in glass positives and in paper pictures, the following is a cheap and easy way of making an old carved chair, that will look well in a picture for either sitting or standing figures:—A deal skeleton chair is put together (*as fig.* 1); pieces of thick cord or rope are then bound round the legs and side frames of back, while

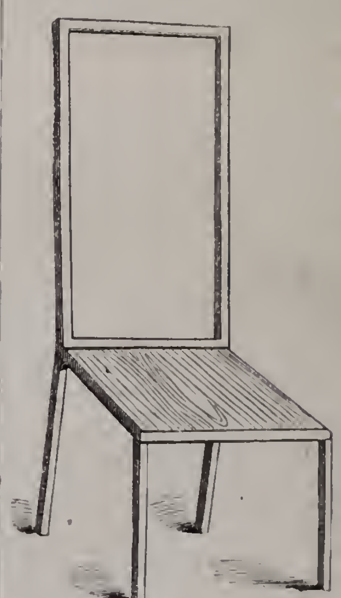


Fig 1.

Fig 2.

pieces of thick pasteboard are cut out, as fancy may direct, and placed round the frame, and in centre of back, and at top. It is then coloured black, or dark oak, and varnished; a cushion put on seat; and, for three or four shillings, we have a chair that looks as well in a picture as a solid oak carved one at £3 10s.

PHOTOGRAPHS OF SCOTTISH CELEBRITIES.

We have received a communication from the Committee of the Archæological Exhibition, recently held at Aberdeen, informing us that they have had photographs taken of the more interesting portraits exhibited, which include those of

the most celebrated personages whose names are familiar to readers of Scottish history. These photographs were taken at the suggestion of the Prince Consort. The photographer employed for this important work was Mr. Wilson of Aberdeen; but, as we have never seen any of this gentleman's pictures, we are unable to say whether the fact that these photographs were executed by him is any guarantee of their excellence, or otherwise. For details as to price, &c., we must refer our readers to our advertising columns.

The Amateur Mechanic.

GLASS—(*continued*).

We have hitherto made no mention of glass rods in connection with glass working; it will be obvious, however, that for most purposes to which they are applicable, the same, or similar manipulation for fashioning them, will be necessary. In using heat to soften glass rods, it must be borne in mind that the rod being solid will require a little more time than a tube to become thoroughly softened through, so as to bend easily.

Glass rods are useful for a variety of purposes in connection with photography. One of the most common is the spreading of solutions in preparing sensitive paper and in development. Instead of using a common straight glass rod for such purposes, the photographer will find it much more convenient to make a bend in the rod like the diagram :—

The advantages of this form, as will be readily seen, are increased facility in using, and the freedom from risk of staining the hand, which will always be above the solution in use.

For the same purpose, and suggested by the rod of this shape, is another little contrivance which all our readers may not be familiar with. It is a tube bent to the same shape as the above, and acting somewhat on the principle of the pipette. The tube is closed and sealed in the flame at one end, and near that end is perforated a small aperture. The other end, which is held in the hand, is open; to use it, the closed end is filled with the solution to the bend, either by applying the lips to the open end and withdrawing the air from the tube, or by attaching a vulcanised india-rubber ball or bottle, and using it as we have before described. It is then used in the same manner as the rod described above, a supply of the solution to be spread being obtained from the small aperture of which we have spoken—the amount of the supply being regulated by stopping or unstopping the open end of the tube, or by compression of the india-rubber bottle.

Another convenient form of glass rod, especially for spreading developing solutions on paper pictures, where the paper is pinched up at the edges so as to form its own developing dish, is a glass rod bent at right angles so as to form a handle. For the same purpose, the rod bent into a triangle, leaving one end long enough to use as a handle, is also very convenient. The manipulations here are so simple as not to need describing.

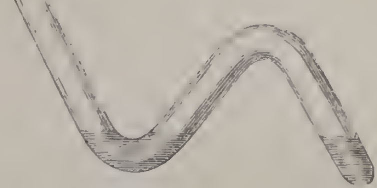
An excellent contrivance for using solutions with which it is desirable the hand should not come in contact—in such cases, for instance, as using nitric acid for cleaning glass plates—is made by means of a glass rod. A piece of rod of convenient thickness is held in the flame until it is soft, and then bent double, and a piece of tow, or unspun cotton, is then twisted in and out until a mop is formed suitable for the purpose.

A Buckle's brush is made, and used on a similar principle, from a piece of glass tube. A piece of tube of one-third or half an inch diameter, and five or six inches long, is smoothed, and flanged slightly at each end. A piece of clean cotton wool, sufficiently large to plug the tube, is partially drawn, by means of a hook of silver wire, into one end of the tube, leaving sufficient projecting to form a mop or brush. Silver solutions may be spread by this brush with convenience and impunity, the solution being uninjured and maintaining the same strength, which is not the case when applied by floating paper on it. This brush possesses the advantage of being easily renewed at any moment, by the mere addition of a fresh piece of cotton. Its form is shown in the margin.

A neat and very cleanly developing stand may be made of glass rod. The simplest mode of effecting this, is to bend a piece so as to form a right angle, bending down again two or three inches at each end to form feet, and then joining a third piece the length of the part turned down to the bent corner, to serve as the third foot of the triangle thus formed. To join two pieces of glass rod, it is difficult to obtain sufficient heat without the aid of the blow-pipe.

A variety of useful contrivances will, as we have before said, from time to time suggest themselves to the experimentalist to be made from glass tubes and glass rods, details of which it is unnecessary to enter into any description of here. We will only, therefore, before leaving this part of the subject, refer to the facilities presented by tube retorts, easily constructed by the amateur, for simple experiments in distillation, where small quantities are to be operated on.

Miniature retorts and receivers of various forms may be constructed out of glass tubes. The simplest, perhaps, is shown in the diagram, and consists of a retort and receiver in one piece :—



1 2

As will readily be seen, the liquid to be distilled occupies the part marked 2, and, on the application of suitable heat, rises in vapour over the bend, and is condensed in the part marked 1, which is kept cool by means of a piece of wet rag. The distillate may then be easily removed by means of a pipette or a syringe. This contrivance is, of course, extremely simple, and only suitable to certain kinds of distillation. On the subject at large, it is no part of our province here to enlarge, our only purpose is to suggest the number of useful appliances for experiment in this direction which may be constructed by the experimentalist himself from glass tubes.

We shall proceed next week to treat of the graduation and marking of various kinds of glass vessels for accurate measurement.

(*To be continued.*)

Photographic Chemistry.

CARBON. C, *equivalent* = 6.

Carbon forms the chief proportion of all organic substances. It is found in widely-different forms; we find it in nature in a perfectly pure and crystalline state, as the diamond, mostly of a white, but not unfrequently tinted with yellow, brown, blue, or pink. Diamonds are found in the alluvial deposit, arising from the disintegration of old rocks, transported by water. The greater part of them are obtained from India, Borneo, or Brazil; and not, as a rule, without long and fatiguing search. The crystalline form is sometimes very sharp, and that of the regular octahedron, or cube, or some modification of these forms. The faces are seldom plane, consequently the edges are rounded also, which arises, probably, from the friction to which the crystal has been subjected.

The diamond is the hardest of all known bodies; it scratches them all without exception; it may be split, cloven, or broken up in a steel mortar, but it cannot be "cut," as it is termed, or polished, except by means of its own dust. Two rough diamonds are rubbed together until they have assumed the outline of the form they are intended to bear, the dust which arises from this operation being preserved with the greatest care. A little olive oil is then put on a steel plate, and a little of this dust sprinkled over it; the plate revolves horizontally with great speed, and

the diamond, being brought in contact with the surface, receives the shape the operator desires to give it. One familiar and very important use of the diamond is to cut glass—an operation which it performs with great ease. A great variety of attempts have been made to produce diamonds artificially, but they have all been unsuccessful. Being infusible under the highest temperature we can produce in our furnaces, they cannot be produced by fusion; and as we know of no solvent, they cannot be crystallised from a solution. We have said that it is infusible and unalterable in the heat of any furnace; but it may be consumed in two ways, either by making it incandescent, and then dropping it into a jar of oxygen—in which case it burns brilliantly, and forms carbonic acid gas; or, by placing it between the poles of a powerful battery, when it becomes heated to such a degree, and is so brilliant, that the eye cannot look upon it; but if it be viewed through a piece of smoked glass, it will be seen to swell and fall to pieces, and is converted into a grey, metallic, friable substance, which is, in fact, coke.

There is another form in which carbon exists in a state of purity and crystallised, and that is as *graphite*, or plumbago: in this form it is familiar to every schoolboy as the material of which lead pencils are made. The source from which the finest graphite is obtained for the above purpose is from Cumberland, where it is obtained from veins which traverse the slate beds of that district.

All organic substances are compounds of hydrogen, oxygen, nitrogen, and carbon. When these substances are submitted to a high temperature, the volatile products of decomposition are driven off, and the carbon alone remains. The appearance presented by this carbon differs. By the imperfect combustion of resin or pitch, lampblack is obtained; this is the kind of carbon employed in the production of carbon positives. But, as this sort of lampblack always contains a proportion of oily matters, it should, before being used in this way, be calcined in a covered crucible. It is obtained in the form of charcoal by heating wood to redness in a closed vessel—the charcoal thus obtained retaining the appearance which it formerly possessed, except as regards its colour: if it be broken, the structure of the wood will be seen. If we calcine an animal substance—as bone, for example—we obtain a kind of charcoal, which is brilliantly black, and presents the appearance of having been fused; but this is not the case, the appearance is due to the action of the gases in making their escape from the mass. This kind of charcoal, which is commonly termed animal charcoal, is a substance of great value, and is much used in chemical processes and manufactures. It possesses the property of depriving organic solutions of colouring matters, as, for instance, in the making of photographic varnishes, which we described recently, and is very extensively employed by sugar refiners.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 31st December, 1859.

A MEDICAL man, M. le Dr. Alexandre Valtier, who practises photography successfully in Paris (where he is, perhaps, better known as M. Alexandre), has lately called attention to a curious photogenic phenomenon:—A photographic proof had been brought to him from Shanghai, in China; this proof, which was a negative one, was so decomposed when it arrived that it was impossible to distinguish its characteristic features. However, on obtaining positives from it, M. Valtier was much surprised and delighted to find that they were perfect in every detail. He was at a loss to explain this, and demanded an explanation, if possible, from the *Société Française*. MM. Girard and Davanne remarked, that what had disappeared from the negative in question were the black parts, formed, according to the French theory, of metallic silver almost pure. These black portions had become pale by the formation of a "sulphide of silver with a yellowish tint." (It may be well to add, that no combination of sulphur and silver exists which has a yellowish colour.) "Under this new form," continue the authors quoted by *Le Cosmos*, "the black portions are hardly perceptible by the eye; they have lost their visual opacity, if we may thus express ourselves, but have retained their chemical opacity, so that the light which passes through them loses all its photogenic properties, and has no more action than the yellow rays of the solar spectrum, whose photogenic influence is almost negative. That which is no longer a screen to the eye, or, in other terms, which no longer produces the sensation of shadow, constitutes, however, a perfect screen or shadow for the sensibilised paper which is placed behind it."

M. Cordier has recently entertained the *Société Française* upon a phenomenon which is, doubtless, of common occurrence in photographic *ateliers*, namely, the sudden transformation of a negative proof into a positive one, by the simple opening and shutting of the door of the dark room in which the author was operating. "A plate having been sensitised in the ordinary manner," says M. Cordier, "with iodo-bromised collodion containing cadmium and a bath of silver rather old, and much charged with alcohol and ether, was exposed for forty-five seconds to an ordinary light. During the sensitisation, the door of the laboratory was opened by accident, but instantly closed again. When developing the proof, however, it became a vigorous positive by transparency." The phenomenon in question is attributed to the action of light upon the plate during the short interval that the door of the laboratory remained open.

In the November number of the *Bulletin de la Société Française* is a long paper by M. le Comte de Schonwaloff upon a similar subject, namely, the production at will of a positive or a negative proof on collodion.

Many years ago, a celebrated French astronomer set out for Madagascar to witness a passage of Venus across the sun's disc. Unfortunately, after a long, tedious voyage, the vessel which carried the astronomer and all his delicate instruments, was detained by contrary winds near the coast of Africa; and the passage took place while our astronomer was yet at sea! Bitterly disappointed at having thus lost a most valuable astronomical observation, he determined to remain eight years in the far-off land, until another passage should occur. The day arrived in course of time, but, alas—it rained!

If we can predict with mathematical certainty an eclipse, the apparition of a comet, or the occultation of a star, we have, unfortunately, no means of being assured that the weather will permit the observation of the phenomenon in question. Thus we should write in our astronomical catalogues as they do at the Steam Navigation Company's offices—an occultation of such or such a star will take place, visible in latitude x°, "*wind and weather permitting.*"

M. Faye has recently published long papers in the *Comptes Rendus*, upon the observations that should be made during such or such an astronomical occurrence that is to happen at such or such a date. Thus, during the present year, he proposed for the eclipse of the sun many interesting observations, photographic among others; but the day it occurred was so cloudy that the enthusiastic astronomer's advice very nearly missed its aim. During the last month or two M. Faye has likewise published, in the *Comptes Rendus*, similar propositions relating to the magnificent solar eclipse that is to take place on the 18th July, 1860. It will be total in Spain and Algeria, and any one who has read the interesting notices of François Arago, in the *Annuaire du Bureau des Longitudes*, or in his *Œuvres Complètes*, is aware of the immense interest attached to a total eclipse of the sun. From forty to fifty astronomers—English, French, Spanish, German, Russian, and Italian—will rush into Spain to witness the occurrence on the 18th of July next year; a warm date for the journey.

M. Mœdler, of the Dorpat observatory, in Russia, informs us that, during this eclipse, the four principal planets, Venus, Mercury, Jupiter, and Saturn, will form a species of rhom-

boidal figure around the darkened solar disc. Many centuries will elapse before such a remarkable disposition will occur again. In fact, the next eclipse of the sun, which can be subjected to tolerable observations only, will happen in 1887—not before.

The eclipse of the 18th July next will commence in the Oregon territory, near California, and finish on the borders of the Red Sea. Between these two extreme points the phenomenon will traverse North America at about 60° lat. N., quit the new world at Hudson's Bay, cross the Atlantic, and, after passing over 130 leagues of Spanish ground, will enter Africa, cross the Nile to the north of Dongolah, and finish in Ethiopia. Those astronomers who intend to observe it will certainly profit by the reading of M. Faye's notes in the *Comptes Rendus;* wind and weather permitting.

M. L. Krafft has been prosecuting some experiments on the employment of sulphate of lead in glass making; the results of which he has laid before the *Société d'Encouragement* of Paris.

One equivalent of silica and one equivalent of sulphate of lead (residue of the fabrication of acetate of alumina for dyers, &c.) were heated together in a crucible. At a red heat the mass effervesced, and an evolution of sulphurous acid took place. This operation, which is rather long, produces a yellow melted mass, which is not vitrified. If common glass be added to it the mixture melts well, and gives a glass resembling crystal. As the fusion is slow and tumultuous, M. Krafft adds to the mass half an equivalent of carbon. The mixture thus composed of one equivalent of sulphate of lead, one equivalent of silica, and half an equivalent of carbon, melts well at a dark red heat, and gives a very white transparent glass, which, melted with a certain quantity of common glass, gives a superb crystal.

The addition of carbon having rendered the decomposition of the sulphate of lead so much easier, the author doubled the dose of silica, and, in order that the fusion should proceed calmly, he added immediately the necessary quantity of common glass. But the fusion was more difficult; it was necessary to employ a forge; the glass obtained was, however, of a very fine quality. Thus, *bisilicate* of lead can be employed in glass-making, and M. Krafft affirms that oxide of lead permits us to employ twice as much silica as in ordinary glass.

The author next endeavoured to compose glass piece by piece, and to obtain the sulphurous acid from sulphate of lead and sulphate of soda. To this effect, he melted together one equivalent of each of these salts with two equivalents of silica. He obtained a spongy mass which heaved itself above the crucible like the froth of the glass-houses. As before, he rendered the fusion calmer by the addition, this time, of a whole equivalent of carbon. The melted matter divided into two layers—the one fluid like water, the other much denser. By mixing them together, a fine glass was obtained. Finally, thinking that the sulphuric acid of the sulphate of lead would, perhaps, decompose common salt, and that it might be possible, therefore, to employ the latter in the glass-houses instead of sulphate of soda, the author heated together one equivalent of chloride of sodium, one equivalent of sulphate of lead, and two equivalents of silica. In every experiment the fusion was impossible, even at a violent forge-fire, the mass swelled and became hasty, but remained without a trace of vitrification. The heat employed was, however, so great that the crucibles had become soft, and gave way whilst being drawn from the fire.

THROUGH JAPAN WITH A CAMERA.*

(*From our own Correspondent.*)

I HAVE experienced some hot weather in Europe, and perhaps I have known the thermometer to rise there nearly as high as in this country, but the degree marked by the mercury on the thermometical scale would not give you an idea of the intensity of the heat here. There is a close, oppressive feeling in the atmosphere which overpowers you both physically and mentally. Although I have been accustomed to a very cold climate, I have borne the summer heat of the south of France and of part of Italy, with comparative indifference; but there is something in the heat of the interior of Japan which occasionally prostrates me utterly and entirely, and I ride along with an umbrella over my head, a man leading my horse, and with eyes which see not, and ears which are deaf to all external sounds, but with sounds *in* them which resemble the monotonous tolling of a bell, or a buzzing as if a whole hive of bees had established a colony in my head. Even Dsetjuma appeared to feel it nearly as much as I did, although he told me he could bear the heat of Nangasaki without the least inconvenience. I am inclined to think that this suffocating sensation is caused by the stillness of the atmosphere, in the valleys between the hills, and in the volcanic districts, to the presence of an unusual amount of carbonic acid.

The day on which we quitted the cottages above-mentioned turned out one of these intensely hot days, and long before we reached the inn from which I had departed so abruptly on the previous evening, I had become indifferent to discovery and everything else, and I question whether, if I had been then told that all my negatives had been stolen or destroyed, and my collodion bottles smashed, I should have been capable of appreciating my loss. Silently and slowly we rode along side by side, the very horses appearing to feel the heat, and to suffer from it almost as much as we did. At last we reached the inn; and I was roused a little from my lethargy by the sight of the landlord standing at the door, for I could not help thinking that there was just a possibility he might have given information to the authorities, notwithstanding the representations which might have been made to him by the servants on the previous evening; and it was not without a certain degree of inward trepidation that I dismounted and entered the inn along with Dsetjuma; the landlord walking backwards in front of us, and in this way conducting us to the best room. I could not detect in his face the slightest expression of animosity, although I was sorry to see on it the mark of my cane. As soon as we had established ourselves comfortably, Dsetjuma sent for the men whom he had sent on the night before, but instead of seeing the men he wanted, three strangers came into the room, dressed all alike in long black robes, and having a hideous figure embroidered on the breast. It did not require a second look to tell me that these were officials, and my fears immediately suggested that they had come to seek me, and I very soon found that my fears were not groundless. Dsetjuma asked them a great many questions respecting the charge, and the official before whom I was to be taken; and, after we had refreshed ourselves a little, we started off under the escort of the officers, one of whom marched on each side of me, they walking, and I on horseback, for the distance to the court of justice was full half an hour. By the time we reached the court-house—if I may so term the place into which I was taken, which was, in fact, a long apartment, one side of which was open to the air, though furnished with bamboo blinds, or shutters, which could be closed in cold weather—a considerable crowd had collected about us, and from the interest they displayed in the matter I imagine they do not often see an entertainment of the kind—for such it seemed to them—and that the magistrate's office, as regards the administration of justice, is a sinecure in this district. I was placed in front of a raised seat running across the upper end of the apartment, and here I remained standing waiting for the judge to come and take his seat. I had to wait for some time before he appeared, and I was in a perfect fever of anxiety from trying to guess what charge I should be called upon to answer. At last, in walked a pleasant-looking old gentleman, whose very appearance relieved me very much, and I was still further reassured on seeing Dsetjuma following him and taking a seat on the

* Continued from vol. iii. p. 201.

dais. On his entry all the Japanese present threw themselves on the floor and knocked it with their foreheads, and I was forced to do the same, although, with my European ideas, I was very much disgusted at the necessity. After the prostration I stood up, and with a beating heart listened to the reading of a long paper, the meaning of which I could not comprehend entirely, but I could understand that frequent reference was made to the landlord, and that the word by which they express "foreigner" was not once mentioned. After this tedious ceremony was finished—and it seemed to me to last an eternity—the magistrate delivered a short speech, at the conclusion of which Dsetjuma came to me, and, taking me by the arm, led me outside. I dared not ask him a question, for fear of those round us hearing me speak in a foreign tongue; but when he told me to mount my horse, and we began our journey back to the inn, I wanted no words to tell me that the affair was over in some way or other, and that I was safe.

As soon as we were well on our way back, I got the whole story from him. The landlord, smarting under the blow I had given him, and in great tribulation at the abrupt disappearance of his best dress, had started off at once and made his complaint to the magistrate. When our men arrived with the palanquin, and he had heard what they had to say on the subject, he would very gladly have said nothing more of the matter, but it was too late; Japanese forms of justice do not admit of compromises out of court; the complaint once made must be investigated before the magistrate. He, however, did all he could to arrange the affair, and made a statement which was formally written down by the magistrate's assistant, and was that I had heard read in court. This was done under Dsetjuma's direction, and contained the solemn affirmation that he (the landlord) had made his complaint under an erroneous impression, and that he desired to withdraw it, and humbly implored pardon for having ventured into the presence of the most wise and just, &c., &c., with a statement which was contrary to the truth. Luckily he had not hinted that he suspected I was a foreigner, so that a little conversation between Dsetjuma and the judge soon terminated the matter in a way which was satisfactory to all parties, and more especially to me, because it spared me from being questioned—an ordeal which must inevitably have involved me in serious difficulty.

During the remainder of our stay at the inn the landlord endeavoured, by the display of the most abject humility, to make me forget the inconvenience he had caused me, for which, however, I could not blame him under the circumstances, especially considering the provocation I had given him; and when we settled the bill I added a sum as payment for the use of his clothes, which proved to him that I was sorry for the violence I had exhibited.

We were eighteen days travelling among the hills and mountains from this place to the sea coast, stopping whenever anything of sufficient interest presented itself to form the subject of a photograph. Sometimes it was a temple, the external appearance of which was not unlike some which are met with in China—long buildings with a curved roof covered with tiles, and ornamented with heads and figures of fabulous animals, uglier than any I ever saw on the gothic edifices of Holland. Inside, they usually had images representing the particular deity to whom the building was dedicated, and symbolising his attributes. We took pictures of most of these temples, because Dsetjuma wished to have them; otherwise, I should very seldom have taken the trouble myself, except when the scenery around it made it worth while. We found it very difficult to get satisfactory negatives of the interiors of these buildings, from the want of light; but we got a pretty good number of images of these hideous figures, by inducing the priests to bring them outside, which they were willing enough to do where the things were movable, in consideration of a moderate present, as a remuneration for their trouble.

(*To be continued.*)

PHOTOGLYPHIC ENGRAVING.

SIR,—I am in the habit of reading "THE PHOTOGRAPHIC NEWS," and glancing over every other photographic publication issued; and am, therefore, not unused to see an amount of laudation bestowed by some of these on inventions which experience has taught me do not altogether deserve it. As a general rule, I can understand the reason why photographs which are sent to the editors almost invariably receive a favourable notice, from the probable circumstance that nobody would send pictures for review unless they were really good ones, and I must admit that my experience agrees with this supposition, for I have never bought any prints which have been criticised in your paper favourably, without having reason to be satisfied with your judgment; and the number which I have bought, from the fact of their having been criticised in "THE PHOTOGRAPHIC NEWS," forms a rather extensive selection. It is the conviction which I have of your thorough impartiality, in conjunction with the character of your paper, which induces me to address this letter to you, especially as the subject is one which has been almost entirely confined to its columns.

The subject to which I allude is the invention of the improved method of chemical engraving by Mr. Fox Talbot. In common with the other subscribers of "THE PHOTOGRAPHIC NEWS," I received the interesting little specimen which you presented to us about twelvemonths ago, and recently the larger and better photoglyph of the Tuileries, and I felt, as everybody else must have felt, that a great step in advance had been made, and that exceedingly important consequences might result from the invention, which probable consequences were so eloquently described by you at the time when you first made the discovery public. The announcement which you made, that Mr. Talbot would not object to amateurs trying experiments, induced me, as it no doubt did many others, to buy a few small plates of steel and copper, and try how far I could succeed by closely following your description of the process. Most of these plates I spoiled in my experiments, but three of them were so far successful that I was able to get impressions from them in a copying press, which, though faint in places, were not by any means total failures. But, though to a certain extent I had succeeded, it never occurred to me to forward you specimens, which were unquestionably inferior to those you had given away, and could not, therefore, possess any interest for you, or your readers; it has been, therefore, with very great surprise that I have recently seen a photoglyph printed from a plate engraved by a Mr. Beatty. This gentleman appears to have sent a circular letter to each of the photographic periodicals, which was published simultaneously in all of them, always excepting "THE PHOTOGRAPHIC NEWS." In a letter, which is written in a style that would induce one to imagine that Mr. Beatty may be a better photographer than grammarian—he says, "I can produce with it all that can be desired in the representation of animate or inanimate objects, preserving the faintest tracery, the half-tone and gradations of tints to the deepest shades; and in no way to use the graver, except for the margin and name." Now, the mere publication of this circular alone leads to the inference that the editors of the periodicals who published it were satisfied, from the specimen sent with it, that Mr. Beatty stated no more than the strict truth in his letter, and one of them even went so far as to say that it showed a great step in advance in the art of photoglyphic engraving.

I have at this moment one of the photoglyphs in question before me, and in pronouncing or implying so favourable an opinion of it, the editors of the periodicals I have referred to above have, in my judgment, scarcely done their duty as impartial critics. It is a wretched production altogether, and has nothing whatever to recommend it, or to entitle it to the critical notice of the most insignificant of photographic periodicals. It is, in fact, no picture at all; all that there is, is a dim shadowing forth of the front of a building, but not the slightest

trace of vigour or half-tone, or anything else which constitutes a picture; yet this failure is termed by Mr. Beatty a "triumph of science and art," whereas it would have been much more appropriately named if he had termed it "an illustration of the impossibility of engraving by Mr. Talbot's chemical process."

It may appear to you that I write somewhat warmly on this subject, and, if I do so, it is because I feel strongly regarding it; indeed, if I did not, I should not have taken so much trouble to procure a sight of a proof after reading the flattering notice of it in the photographic journals. Beside this, I have a very strong feeling of regard for Mr. Fox Talbot, who is a gentleman, and whose feelings must have been greatly outraged by the manner in which his name has been trailed in the dirt by Mr. Beatty, for I am persuaded that Mr. Talbot has no more expectation or desire of such a mark of royal favour as Mr. Beatty hints at than I have.

I trust you will do me the favour of publishing this letter, which may, perhaps, have the effect of making the editors of your photographic contemporaries a little more guarded in the expression of their approbation in future. In the present instance, supposing the print to have been for sale, they would have made themselves parties to defrauding the public, by inducing it to believe that to be excellent which is, in fact, not worth anything. In proof of the justice of what I say, I inclose you the print in question, and am, Sir, your obedient servant,

A Member of the Photographic Society.

Proceedings of Societies.

The Photographic Society.

The ordinary monthly meeting of this Society was held on Tuesday evening last, Roger Fenton, Esq., in the chair.

After the minutes of the proceedings at the last meeting had been read, the Chairman announced that certain persons were desirous of becoming members of the society, who were duly elected.

The Chairman called upon Mr. Vernon Heath to make a statement to the society respecting a tent which was erected in the room.

Mr. Vernon Heath said that he had little to say on the subject. The tent was so well known to photographers, that there were only one or two points which he should dwell upon. Its form, as would be perceived, was rectangular, six feet high in the clear, and three feet square. When erected, it formed a system of triangles, which supported and strengthened each other; the table, which was a folding one, being the corner stone of the fabric. The bath was suspended from the table, and the plateholder was made to rest on a projection, fixed on the framework. Instead of cutting a hole in the table, to allow of a sink being attached to it, as had been formerly done, he had invented a tray which could be folded up when not in use, and very readily put together when it was required for developing the picture in, so that the table was left perfectly clear for the operator. The tent was as perfect a thing as could be made, and did great credit to its inventor, Mr. Smartt. As a proof of the estimation in which it was held by those photographers who had tried it, he might mention that Messrs. Negretti and Zambra, who were above the petty jealousy manifested by some persons in the trade, had just sent off another to their photographer in China, he having found it to answer so well.

Nobody responding to the Chairman's inquiry whether any person wished to make any remarks on what Mr. Heath had stated, he called upon Mr. Hardwich for the paper he had prepared.

Mr. Hardwich then read a paper on "Collodion for the Dry Process," of which we give only a brief abstract in this report, as we propose to publish it at length in an early number. He mentioned that in the first attempts to prepare a collodion for the dry process, a heterogeneous mixture of materials was employed, but that it was now well established that the best material for the purpose is fine cotton wool. At the first introduction of Mr. Gaine's method of parchmentising paper he tried some experiments with this material. He found that the paper which remained only a short time on the nitro-sulphuric acid made very good collodion, giving a fine tough film, while that which was left on for a longer period produced a powdery collodion, which rubbed up under the finger like soft soap, and adhered strongly to the glass. He found that either collodion could be prepared at will. If cotton is immersed in a mixture of three parts of oil of vitriol, one of pure nitric acid of 1·45, and three-fourths of a part of water, a fine transparent tough material is obtained, which may be converted into the powdery pyroxyline by drying, and subsequent dipping for a moment in a mixture of three parts of nitric acid, and one of sulphuric acid. The pyroxyline thus prepared dissolves in alcohol, and becomes of a gummy consistency. The former pyroxyline gives an opalescent film on immersion in the bath; the collodion prepared from the latter gives a dense, creamy film. When plates coated with these collodions are washed and dried the former is bright and hard—the latter dull, having the iodide apparently on the surface, and a solution of albumen, or developing solution, flows freely over that surface. He next proceeded to examine the action of these collodions in the Taupenôt and Fothergill process, most of his experiments having been made with the latter. Dr. Morris had stated that a powdery collodion favoured quick development, but he had found that it depended very much on other causes. Both collodions yielded weak images when newly iodised, especially the powdery, which was worse in proportion to the degree in which it possessed this quality, the iodide merely resting on its surface. He used bromide, in addition to iodide, in collodion for the dry process. There is more contrast in the picture taken with old iodised collodion, and the plate might be washed freely without injuring the intensity. To six drachms of the collodion he added two drachms of absolute alcohol, in which a quarter of a grain of pure potash had been dissolved, allowed the action to proceed for twenty-four hours, and then dissolved in each ounce five grains of iodide of cadmium, and one grain of bromide of ammonium. In the Fothergill process the tendency to active development is so strong that there is no difficulty in obtaining a dense picture. The action of potash on the pyroxyline is complex, and he had seen well-defined crystals of nitrite of potash in old collodion residues. The effect of this nitrite is to hasten the development and increase the contrast between the tints; but the presence of any quantity of this nitrite in the absence of potash, will not produce an equally vigorous image; which he partly ascribed to organic decomposition of the pyroxyline being produced by the potash. Pyroxyline, in some cases, after undergoing partial decomposition by action of alkalies, will abstract a portion of nitrate of silver from the bath. He had hoped to have been able to perfect a collodion which would have rendered the use of a preservative substance unnecessary, but he feared that he would not be able to succeed. The great defect in the Fothergill process was the slowness of development arising from the film drying up. This was prevented by the use of gum or gelatine. The preservative substances have a chemical and mechanical action, and the colour and appearance of the image varies according to the nature of the substance used. Mr. Hardwich then proceeded to show by experiment that gelatine in some way combined with nitrate of silver to produce what he termed a gelatino-nitrate of silver. He took a test-tube containing gelatine, and dissolved it in water by aid of the flame of a spirit lamp; he then added solution of nitrate of silver, but chloride of silver was not precipitated, although the gelatine necessarily contained a considerable quantity of chlorides; he, therefore, came to the conclusion that there was something more than a mixture of the substances, and that they did, in fact, form a chemical compound. To break up this combination, he poured in the tube some nitric acid, and in a very short space of time chloride of silver was formed.

The Chairman asked if any gentleman had any remark to offer on the interesting paper which had been just read by Mr. Hardwich, and as some minutes elapsed without any member stirring, Mr. Fenton himself rose to say that Mr. Barnes had sent sundry plates which he had prepared with collodion made for working the dry process. These negatives were arranged along the table where they could be inspected by the members.

Mr. Davis had heard Mr. Hardwich's paper with great interest, but he could not entirely concur with him in his con-

clusions. He had himself tried many experiments in the manufacture of collodion, as well as in its working, and he could not agree with Mr. Hardwich that a powdery collodion was the best for the dry process. The best, in his opinion, was that which gave a close horny film, and though it might be difficult to cause the developing solution to penetrate it after it had once been dried, yet that difficulty could be overcome if a solution of some organic matter were poured on the film while still wet. This organic matter entered the pores of the collodion, and, being soluble in water, was readily penetrated by the developing solution; in this way you had the advantage of using a tough collodion which likewise possessed the single advantage ascribed to the powdery collodion—that of being easily permeated by the solutions.

Mr. Elliott had come provided with a paper he had written on the subject, which he read; it was very well done, but as it contained nothing absolutely new, we cannot spare the space which would be required to give it in detail.

Mr. Hughes complimented Mr. Hardwich on the ability with which he had prepared his paper, and thought it was highly creditable in a gentleman like him to give so much of his time to the practice of experiments in which all photographers were so deeply interested. There was one fact which Mr. Hardwich had discovered, and which seemed to him of great importance, he meant the combination of nitrate of silver with the organic matter of the film, so that here was another agent in the production of the image hitherto unthought of.

On Mr. Hughes resuming his seat, Mr. Malone and Mr. Shadbolt rose simultaneously, but the latter gentleman gave way to Mr. Malone, who said that the discovery of the combination of nitrate of silver with organic matter was not quite new. Mr. Fox Talbot, many years ago, took a sheet of gelatine and immersed it in a very weak solution of nitrate of silver, yet, after exposure, the image was found to be in the gelatine and not on the surface of the albumen. He doubted whether it was right to call the combination of nitrate with the gelatine "gelatino-nitrate of silver," as Mr. Hardwich had done, because nobody, in fact, knew what it was, as the substance had never been isolated, and, until that was done, no name could be given to it. He, unfortunately, could not himself give much time to the study of subjects connected with photography, but it gave him great satisfaction to find that Mr. Hardwich could, and he thought that very valuable results might ultimately flow from these researches.

Mr. Shadbolt was about to address the meeting, when he was interrupted by Mr. Hughes, who rose to make an explanation which anticipated some of the remarks which he proposed making; he therefore confined himself to correcting a misapprehension into which Mr. Davis had fallen. He (Mr. Shadbolt) did not understand Mr. Hardwich to recommend the use of a powdery collodion, as Mr. Davis had stated, but that he merely intended to mention a fact connected with it, and that in reality he gave the preference to the horny or parchmentised collodion. After a few unimportant observations, Mr. Shadbolt resumed his seat, and was succeeded by

Mr. Crace, a practical man, who wanted to know if any gentleman present, who must have worked with the dry collodion during the past summer, would be kind enough to acquaint the meeting with the result of his experience—evidently thinking that a small quantity of fact was worth any amount of theory; but no person rising to make any revelations of the kind demanded,

Mr. Shadbolt replied to some observation made by a speaker, with reference to the employment of one solution for coating the plate and sensitising it, as, for example, by mixing the substance forming the film and the nitrate of silver together. He said that Mr. Mayall had tried this long ago, and produced pictures by it, but had not persevered in it, for sufficient reasons.

The Secretary read a letter from Mr. Barnes on the subject of the plates he had sent; but be read it in so low a tone, that we were unable to catch more than a word or two.

After a remark from Mr. Shadbolt,

Mr. Malone mentioned that when he and some other gentlemen were working what is termed the French paper process, some years ago, they found that the pictures were greatly improved, after the bath had been used a certain time, arising from the addition of organic matter, but that they were never able to prepare a bath possessing the same conditions; although they might possibly have succeeded, if they had studied the subject sufficiently.

Mr. Shadbolt mentioned that a dry collodion plate prepared by Mr. Kibble had been shown to him on which a picture had been taken in about the twentieth part of a second.

Mr. Watson, referring to what Mr. Hardwich had stated in reference to the picture being on the surface when newly-iodised collodion of a powdery kind is used, said, that he thought that gentleman was in error in supposing that this was caused by the iodide being all on the surface; with respect to this kind of collodion, the fact was, it depended on the development. He could develop a picture so as to have it all on the surface, or otherwise. In illustration of his remarks, he showed some very excellent glass positives.

Mr. Hardwich replied to the objections which had been raised by the various speakers. He thought the great objection to the Fothergill process was its slowness; the image was so long in coming out. He would have been glad if somebody had been able to give them the results of employing the process for large plates, as almost all those who had written about the process in the journals, had worked on plates of a stereoscopic size. He wished Mr. Barnes were present. Here he was interrupted by

Mr. Barnes, who stood up and said, "Mr. Barnes is here, and is ready to answer any questions you wish to ask him," and then, without waiting to be asked any questions, he went on to say, that he had tried Fothergill's process on large plates, and he found that the film curled off. He had taken every precaution, but this was the invariable result. The only remedy for it was to coat the plate previously with albumen. As to the so-called Fothergill process, it was nothing but a modification of a process he had described full five years ago.

Mr. Hardwich, in continuing his reply, observed, that it did not appear just, that because a man happened to suggest in a distant kind of way that such or such a thing might be employed in photography, yet never tried it himself, that if another did so, and succeeded, by modifying it in certain respects, that this man should be told, "Oh! you are an impostor; I described that process long ago, as anybody can see who looks at my book." He thought that, excepting the discoveries of Mr. Fox Talbot, and the invention of collodion by Mr. Archer, about which there could be no doubt, all other discoveries in photography had been made by individuals whom it would be impossible to identify. The best way was for all to do their best to improve the beautiful art they followed, and then, no doubt, they would all get a share of the credit.

At the conclusion of Mr. Hardwich's reply, the Chairman pronounced the meeting at an end.

South London Photographic Society.

The above held its usual meeting on December 15th, at the Lecture Hall, Carter Street, Walworth. The President being unavoidably absent, the chair was taken by W. Ackland, Esq., Vice-president.

The reading and confirming of the minutes over, several gentlemen were thanked for donations; among them Mr. Pouncey, who, at the Secretary's request, had generously forwarded three excellent specimens of carbon printing for the Society's folio [a landscape, a portrait, and a copy from some rare old print by Dr. Diamond].

A new stereoscope was exhibited by its inventor and patentee, Mr. Bincks. Its novelty consisted in the power it had of being, by a very simple arrangement, moved outward and forward, so as to suit all visions. Many, Mr. Bincks said, had seen stereoscopically with this who had never done so with any other instrument.

Mr. Alfred H. Wall was then called upon to read a paper announced under the title of *Practical Observation upon Photographs in their relation to Art*. See our last number.

Loud expressions of applause greeted Mr. Wall upon the conclusion of his paper.

The Chairman was very glad to find a subject broached which would, he thought, call the attention of photographers to a matter of great importance. The mechanical had certainly

taken undue precedence of the artistic, and we had thus given the opponents of photography a strong weapon against it. The pictorial was the most important and most neglected branch of our art, and he was pleased to find the fact asserted in their Secretary's excellent observations. With regard to white skies, he thought the worst thing about them was that they were by no means necessary, because, if the negative had no sky, we could obtain one by the printing.

A vote of thanks was awarded to Mr. Wall.

Mr. H. L. Keens rose to support one suggestion started by Mr. Wall, viz., that photography was not necessarily a mechanical art because it claimed many mechanical appliances. Michael Angelo might frequently have been seen from early morn till late in the evening with an apron tied round his waist, and his hands grasping mallet and chisel, cutting from the solid marble block some one of his mighty works, the perspiration streaming from his thoughtful brow the while. The modern sculptor says, "I cannot labour in that manner;" and consequently forms a model in clay, employs a workman to copy it in marble (which by mechanical aid he is able to do very correctly), and then himself adds the finishing touches. Now, if works thus produced are works of art, why may not photography claim the same appellation?

Mr. Hughes: The subject of art photography is one which justly claims serious thought, and Mr. Wall's paper would undoubtedly call the attention of members to a too-much neglected subject; but there are two sides to every question. In the first place, the scientific branches of photography are in themselves so absorbing, and present so many and such great difficulties to our operators, that the artistic is necessarily lost sight of; and, in the second, it must be remembered that the art is now in its infancy, and that it had come into our hands not as children, but adults. Photography, like infant art, must first master the mechanical, and then turn to the study of higher effects. The mechanical branches being acquired with so much ease would be sure to claim the earliest attention, especially when they were so attractive as in this art; but the higher qualities would be equally sure to assert their supremacy in their own proper order.

Mr. G. W. Simpson, acknowledging the difficulties of manipulation, still thought with Mr. Wall that the absence of artistic culture did not have its origin in any inability of sparing time from the pursuits of photographic chemistry and optics (inasmuch as some of our most artistic photographers were also excellent chemists and opticians), but rather in the fact that photographers have no idea of the effect to be produced. Facility was the bane of the art, so many were content with its worst productions, who could not even conceive a necessity for the mere elementary requirements of art. He did not find either that those who knew little of art were, as a rule, any the better acquainted with science, or *vice versá*. For his own part, he hoped to see a time when the most talented men of the day would be paid by the Parent Society to give courses of lectures upon art as connected with photography—such lectures as we find are given at all other art societies.

Mr. Hughes: Photography has not yet reached that point, although it is probable that we may yet have a professorship of photography instituted in connection with even the Royal Academy. The Photographic Society is not an educational establishment.

Mr. Wall thought it was, and said: If the culture of art is to be continually deferred until those are prepared to study it who never evince the least inclination to do so, I fear photography will indeed lie long under the stigma of being a mere mechanical art.

Mr. Simpson: Ought not the knowledge of art and its mechanism to be pursued coincidently?

Mr. Keens: As they are by students of painting.

Mr. Howard: Much study had been directed to the least practical theories of photographic science which with greater advantage might have been devoted to the principles of art. It was as if an art-student went to work and compounded colours and made brushes all his life as preliminary only to his study of painting. In more immediate reference to Mr. Wall's remarks upon light and shade in landscapes, he had experienced that more of the picturesque and effective was lost by a fear of getting too much shadow than anything else. Most elementary works recommended the strong illumination of the subject, and introduced a fear of the sun getting into the lens, from which cause students frequently went to work with the light at their backs, and obtained the flat, inartistic effects observable in the specimens Mr. Wall had introduced. He always worked, as the members would see by the specimens before them, with a side light.

Mr. Leake thought that, with reference to the artistic in portraiture, it should be remembered that photographers had not that choice of models, and that power of omitting details offensive in themselves, although not of importance to the likeness, which painters had. One lady, with heavenly aspirations apparent in her nose, would insist upon having her head very erect—or upon sitting in an awkward position, simply because Mr. Jones, her spouse, sat so when he was "taken off"—and her friend, Mr. Smith's limbs may be of that peculiarly ungovernable and eccentric description which will defy your most desperate efforts to place them in anything like a tolerably graceful, or rather, not conspicuously awkward position. Again, it is true that a head may be lighted very artistically, and defects lost in skilfully-contrived shadows—but then Mrs. Smith "can't bear them black shadows;" and Mr. Jones sternly inquires if his wife had got a smudgy or dirty face?—or what that black patch means under her chin?—or whether you mean to tell him, sir, that his wife is a nigger?

Mr. Quin thought such objections more frequently arose from the fact of shadows wanting transparency, and so losing their real character, and held up one of the prints on the table as a specimen of shadow delicately relieved with reflected lights, in the manner pointed out by Mr. Wall.

Mr. Wall: The objections of uneducated sitters are as common to artists as to photographers, and, I think, arise from ignorance only.

Mr. Hughes said the public were in a great measure the cause of the inartistic character of photographs—for instance, he knew a gentleman who failed to sell a batch of prints to the dealers because they had not the clean white paper skies, so strongly and justly denounced by Mr. Wall. We must not forget that the commercial view of this subject is an important one.

Several other gentlemen entered into the discussion, which grew very animated and interesting, and was occasionally amusingly relieved by the introduction of *apropos* anecdotes. The different agencies now at work for popularising art-education were pointed out, and some opinions expressed relative to the real amount of artistic excellence obtainable in regard to atmospheric effects, while the sensitive medium and optical appliances were in their present condition.

Mr. G. W. Simpson thought artists were to blame for neglecting photography, and allowing it to fall into unfit hands.

The Vice-President then announced that Messrs. Martin and Keens would contribute a continuation of the

PHOTOGRAPHIC JOTTINGS.—No. 2.

The first of which was introduced by Mr. J. Martin, upon the valuation of a preparation called the *Crystal Enamel*.

There are few practical photographers who have gone through the process of toning, fixing, and washing a positive print on paper, who can have failed to observe the extreme brilliancy in the high lights and middle tints, and the beautiful transparency in the deeper shadows possessed by the picture while floating in the water employed for the removal of the hyposulphite of soda.

The mere allusion to this will, I am sure, be sufficient to awaken a recollection of the desire which all have entertained that the picture might be made to retain, or have imparted to it, the same amount of brilliancy when dried and mounted; this however, it is hardly necessary for me to add, has been found hitherto unattainable, if we except the simple coating with gelatine, adopted, I believe, principally by some French photographers.

It affords me much pleasure, therefore, to be able to bring under your notice this evening a preparation which has been in occasional use on the Continent for some months, and is being now offered to English photographers by Messrs. Horne and Thornthwaite, of Newgate Street, under the name of *Crystal Enamel*.

I have therefore brought with me, and submit for your inspection, six pairs of photographs, one set in the ordinary condition, and the other treated with the enamel: a comparative examination of which will, I am sure, abundantly demon-

strate the power which this preparation possesses of imparting that liquid transparency which has so long been a desideratum.

So much for the *apparent* advantages resulting from the employment of this preparation; there is another, however, which is not so obvious at first sight, of even still greater importance.

The permanancy of positive prints on paper is the one thing as yet unsecured to photographers, notwithstanding the elaborate researches and numerous experiments so carefully conducted with that object in view; and it is not unknown to those who have given attention to the subject, that this want of permanency is due in no small degree to the alternate and combined action of air and moisture upon the chemical constituents of the picture. Hence it follows that if these can be protected from such adverse influences, the decomposition or fading will be arrested, and permanancy arrived at.

I do not mean of course roundly to assert that we have in this preparation the grand *panacea* for the great photographic evil; but to say that if it be admitted that a well-washed photographic print is permanent if it were not for its continued exposure to air and moisture; and if it be further admitted that resinous substances, such as are contained in this enamel, have the property of protecting delicate surfaces from the air, then it seems to me that we at least bring together the conditions calculated to insure the desired permanency; but whether we shall accomplish that end, of course the lapse of time only can show.

I should be leaving my notice of this unique preparation incomplete if I did not describe the method of manipulation which is simple in the extreme.

Having provided yourself with a bottle of the crystal enamel, it is only necessary to prepare one solution, which is done by dissolving (by the aid of heat) 10 grains of Swinborne's gelatine in one ounce of water. This is applied, while still warm, with a flat camel's-hair brush, over the whole surface of the photograph, including the card-board upon which it is mounted. This coating of size, if I may so term it, is allowed to set hard and dry; the picture is then either hot pressed or burnished with an agate burnisher; a piece of cotton wool, compressed moderately tight to about the size of a walnut, is next nearly saturated with the crystal enamel, and in this condition is wrapped in a piece of clean calico rag, which is afterwards just lightly touched by the finger dipped in linseed oil: the whole is then gently rubbed, with a rather short circular motion, over the surface to be enamelled, and the application continued until the required brilliancy is obtained; lastly, finish by applying, in the same manner, alcohol and linseed oil.

The usual vote of thanks was awarded to Mr. Martin.

Mr. Howard stated that he had prints varnished, or rather polished, in the manner described, which, at the expiration of two years, were in a perfect state of preservation.

Mr. Simpson referred to the fact of all varnishes becoming discoloured by time.

Mr. Howard found those he alluded to remained perfectly colourless, and that they bore usage remarkably well. They were of French manufacture.

Mr. Wall thought the high polish objectionable, but considered permanency and the increase of detail in, and consequent transparency of, the shadows fully compensated for what, in small pictures, was a very trifling defect.

Mr. H. L. Keens then contributed a jotting upon the *Proportions found in Figures produced by Art and Photography.*

The relative proportions of the human figure are of the highest importance in art, and in portraiture the peculiar proportions of the individual represented are as necessary to constitute a perfect picture as a correct delineation of the features of the face, and whenever artists have transgressed this principle it has invariably exposed them to the merited censure of the critic.

Gerald Sausse carefully measured the best proportioned persons, and gives it as a rule, that the height of the male figure is seven heads and a half, that of the female eight heads. Du Fresnay says, eight heads are ten faces. Benami has published a curious and interesting diagram, used by the celebrated sculptor Gibson, which gives a certain length produced from that of the head occurring three times in the same figure, and another length occurring five times in the same figure, and which correspond to eight heads, as also to ten faces.

It will be perceived that when the figure rests on one foot according to our general mode ("stand at ease" as it is termed) the height of the figure is somewhat reduced in consequence of the bending outward of the hip joint, and the consequent curvature of the spine. To illustrate this by photography we have but to cast a glance to some fine specimens of whole-length portraits which we are able to produce through the kindness of Mr. La Roche, Mr. Barnes, and Mr. Quin; yet it must be remembered that we seldom find persons whose proportions come up to the adopted standard, and in old age the spine becomes more curved and the knees bend forward, shortening the figure considerably.

A good photograph will give a faithful representation of the subject with due proportions; should an operator, therefore, be doubtful of the correctness of his apparatus, let him measure out carefully the proportions of a living model, and examine if his photographic image produces the same result.

In the diagram of Bonim it will be observed that the head is divided into four portions, three equal ones, thus—first, from the bottom of the chin to the bottom of the nose; secondly, from the bottom of the nose to the indentation a little below the brow, thence to the root of the hair on the forehead, the remaining portion to the top of the head is somewhat less, so that eight heads become precisely equal to ten faces. This is also illustrated by photographic portraits having a diagram drawn upon them, now before you.

Serious mistakes have been made with regard to the proportions of children, frequently they appear like little men and women. In infancy the length of the head is one fourth of the entire figure, and as it advances in life the head gradually becomes less in proportion, until, at maturity, the head is but one-eighth of the whole length. Hence, in consequence, the shoulders of the child appear small. This is illustrated by various engravings after Raphael, Murillo, Corregio, Sir Thomas Lawrence, &c., as well as by photographs of children. (These were produced.)

It has been frequently suggested that the hands are too large in a photographic portrait; this arises from the hands having been generally represented small, but Sir Joshua Reynolds, in his notes on Du Fresnay, states that the hand is the same length as the face, and the thumb the same length as the nose; these proportions may be seen in engravings after Vandyke and others, and on photographic portraits. (Also produced.) It has also been stated that the mouth is enlarged and the eyes appear too small; with regard to the former much depends on the arrangement of light upon the model. If the shadows are too dark, that which arises from the muscles (the depressors of the angles of the mouth), will appear united to the line of the mouth itself, and produce the effect of a mouth too large. With regard to the eyes, care should be taken that the sitter remain some minutes in the strong light of the operating room before the portrait is taken, particularly when the eyes are delicate, for we naturally close our eyes in a strong light. It is thought that the nose is generally too large, particularly towards the end; this arises also from the illuminating, for if the high light is too broad it will necessarily produce that appearance. The photographs here produced are very perfect; in some the high light on the nose is as delicate as in the fine miniatures by Sir Wm. Ross. With such photographs as these (by Messrs. La Roche, Cotton and Wall, Barnes and Quin), the public will not find fault, nor think them *too* truthful. The operator will find sufficient to delight him, when by his art he approaches the beauties of nature, and will then admire our Sir Joshua, Sir Thomas, Wilkie, and others deceased, and our present Landseer, Frith, and others living, who have not forsaken nature for the phantoms of fancy.

A vote of thanks was awarded to Mr. H. L. Keens.

A number of fine photographs, engravings from celebrated paintings and drawings, were produced in proof of the assertions contained in this paper. Several whole-length photographic portraits were placed beside the measurements given for drawing the figure and found to bear the test, and to have the same relative proportions in every part, in common with good paintings and prints. Among these specimens were a set of very artistically beautiful theatrical portraits, by La Roche, which were very much admired.

Mr. Simpson took up a singularly perfect photograph of a most beautiful young lady, and placing it beside an engraving from the painting of Rembrandt's wife, asked which was the most artistic or beautiful production?—(A general laugh.)

Mr. Quin said the delightful picture in Mr. Simpson's hand,

produced by a Dublin photographer, would forcibly illustrate a remark made by Mr. Wall, viz., that but little direct light was needed to produce a properly illumined portrait; for this lady had been taken in a glass room at the bottom of a deep well of inclosing houses.

Some photographs were also produced, taken at Mr. Keens' request by Mr. Quin, from a figure chalked on a wall being six feet by one foot in height and breadth, and divided into six divisions of one square foot each.

Mr. QUIN said, when Mr. Keens proposed the matter he had been inclined to shirk it, fearing to expose a weak point in photography. The diagrams were taken with a whole-plate Ross's portrait lens, three and a quarter inches in diameter, using the full aperture, six inches, and taking the figure six inches in length. He found that no distortion took place; and on taking it again eight inches in length, he was astonished to find that still no distortion was produced. The first diagram was taken from the exact centre of the figure, the camera being perfectly level. The second was pointed at the square below the highest, and inclined (this is the general mode adopted by many photographers when taking standing figures), and the result was, as you see, a general distortion of the whole, none of the squares being equal in length or breadth, and the whole figure being much narrower at the bottom than at the top. Of course, having used the full aperture of the lens, the lines are in parts necessarily out of focus.

Several gentlemen were desirous of making remarks upon Mr. Quin's communication, but, in consequence of the late hour, all discussion upon this and Mr. Keens' paper was postponed until the next meeting, which will take place on January the 19th, 1860.

A paper, by Mr. Leake, jun, on "Failures in the Wet Process: their Cause and Cure," was announced for the next month.

The VICE-PRESIDENT informed the meeting that a sub-committee had been appointed to choose the presentation photograph, which, he hoped, would do justice to the artistic taste and photographic judgment of the gentlemen appointed to select it, and give pleasure and satisfaction to the members. He also announced, per desire of the committee, that all members of provincial photographic societies visiting London would be gladly welcomed to these meetings. He had *personally* received great kindness from many of our provincial brethren at *their* meetings, and, for his own part, should be glad to pay back the obligation in kind. (Applause.) The presentation photograph would, he hoped, be placed on the table at our next meeting, though the copies could not, of course, be ready for circulation for some little time.

Several papers were promised, for future meetings, upon the chemistry, optics, mechanics, and pictorial elements of photography.

The Rev. J. Thompson Smith, B.C.L., was duly elected.

The meeting then adjourned.

Photographic Notes and Queries.

DRY PROCESSES, AND THEIR RESULTS.

SIR,—The approaching London Exhibition will, I trust, contain some good examples of the three principal dry processes, viz., Taupenot's, Norris's, and Fothergill's. There seems to me no other chance of deciding on their respective merits; and, until this is done, beginners in photography will have the trouble, perhaps, of trying all three before they decide which to adopt; and the journals will contain the usual number of markings, marblings, stains, and blisters in the Fothergill process; blisters and spots in the gelatine; and blisters in the collodio-albumen process. With respect to the collodio-gelatine, or Norris's process, it is somewhat strange that, "yielding," as it is said, "results equal to the wet, and superior to any of the dry processes," it should hitherto have been so poorly represented in former exhibitions. I don't remember myself ever to have seen a print from a collodio-gelatine negative, except, indeed, stereo. transparencies, for which, on account of the quick development, it seems well suited. The high recommendation is the great keeping properties of these plates; I have heard of good stereo. negatives being obtained with plates fourteen months old. Taupenot's plates, on the contrary, will not keep, in the hottest weather, more than from seven to ten days, however carefully washed. On the other hand, they (Taupenot's) are very easy to prepare, and, if inclined to stain, may be rubbed to any extent with cotton-wool. This fact alone makes this process, in my opinion, the nearest approach to "universal success." How very seldom you see a wet collodion negative, no matter how skilful the operator, without some spot or comet, which certainly does not improve the resulting print! A Taupenot plate is hardly liable to *this* defect, owing to the thorough washing it receives after the nitrate bath; and the very slow development gives more half tone than the wet process is capable of, under the most favourable circumstances.

Of Fothergill's process I cannot say much myself, having always met with stains when using Keene's formula, and utter insensitiveness when the plates have been well washed. Nevertheless, I am bound to say I have seen the most charming prints, though not of large size, from negatives *moderately* washed, as well as from some which have been under a tap for five minutes.

In conclusion, I think every photographer should be well acquainted with the wet process, in addition to one of the dry; and whether he adopt Taupenot's or Fothergill's, he ought to stick to it, and not trouble himself with every "raspberry vinegar" or "gin and water" process he may meet with in the pages of the journals. H. M.

NON-REVERSED POSITIVES ON GLASS.

SIR,—In accordance with your desire, in your Notices to Correspondents, No. 65 of your excellent paper, I give you the formula which I have practised for years successfully, and which, for the simplicity of the process, cannot fail of success in the most inexperienced hands, if they follow the rules I am about to disclose. I, for my own part, always prefer the simplest manipulations to the more complicated, and which generally work better in the long-run.

The formula proposed was for non-inverting portraits by the wet collodion process, or flatted crown glass; and which no doubt will interest the amateur part, at least, of your readers.

Preparations.—Procure a few ounces of Ramsden's positive iodised collodion: this collodion will be found to work best. A few dozen of the thinnest flatted glass plates, $\frac{1}{9}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, or any other size on which the portrait may be required to be taken.

A glass plate, with a bit of sealing-wax stuck on the four corners, about the size of a pea, which is to lie on the sensitised surface of the film: the bit of sealing-wax at the corners of which protects the film from being injured with the spring at the door of the dark slide. This glass, of course, must be the size of the one the portrait is intended to be on.

Developer.—12drms. of pure protosulphate of iron; $\frac{1}{2}$oz. of glacial acetic acid; $\frac{1}{2}$oz. of alcohol.

Fixing solution.—$\frac{1}{4}$oz. of cyanide of potassium to 10oz. of water.

Silver bath.—1oz. nitrate of silver; 12oz. of water; a few drops of acetic acid.

Manipulations.—Flood the plate with the collodion as usual; place it on the dipper, and lower it to the bottom of the bath. The instant it is at the bottom, raise it and move up and down about thirty times. By this time the plate will be coated and sensitised, and should present a bluish appearance, and be tolerable transparent, which is attained by not allowing it to remain still in the silver bath. If left still in the bath for five minutes, so as to present a creamy appearance, it would not do for non-inverting, and should not be used for the purpose. Place it in the dark slide, collodion side up; place the prepared plate with the wax corners on the top, close to the door of the dark slide. Focus

as usual; expose four or five seconds longer. Pour on developer as usual, and wash and fix.

With but little more trouble than usual, you obtain a portrait—if with a uniform, the facings right—with the marks on the features of the sitter as they are in life.

PRIDEAUX.

REVERSED ACTION OF LIGHT.

SIR,—While endeavouring to copy a direct positive likeness, a few weeks since, I met with the phenomenon termed "reversed action of light," and, thinking a short account of the process of manipulation might be acceptable to the readers of the "NEWS," I have sent you the details.

The size of the picture was 2½in. by 2in., and I was endeavouring to get a full-size negative copy. The lens was one of Lerebour's single combination of 5¾in. focus; size of stop, 9⅛in.

I had taken one copy, but as it was not quite so clear as I wished, I prepared a plate for another trial. While doing so, the light failed considerably, and it commenced raining. Under these circumstances I considered that an exposure of four minutes would not be too much (having found one minute enough with the first plate).

The bath was 35 grains, *very slightly* acid; the collodion, Keene's negative, iodised about three weeks before; the developer, photosulphate of iron, 15 grains; glacial acetic acid, 10 minims; distilled water, 1 ounce. I had only sufficient of this left to develop one plate stereoscopic size (which I was using), and finding, after three or four minutes, only a faint trace of the picture (and that reversed), and the developer become very turbid, I gave the plate a good washing, and then applied a pyrogalic developer, with a little silver added, till I could get no more detail.

The result is a transmitted positive, very foggy and stained, and, apparently, under-exposed.

That the fault was not in the bath or collodion I am pretty sure, as I had just before obtained a decent negative, and the next day took two very good stereoscopic pictures with the same.

W. MAY.

Devonport.

STEREOSCOPES OF LONG FOCUS.

SIR,—To throw some light on the extent of field of view of stereoscopes, permit me to lay before your readers the following experiments:—

1st. Using a stereoscope made of achromatic glasses 18in. focus and 1½in. clear aperture, and having an expanding partition or diaphragm, to admit of the picture being placed at different distances from the lenses, I found the following results.

As I had not stereoscopic pictures, I used circles drawn with a compass, which I think is even better and surer, in giving the stereoscopic field of view, than pictures; then drawing two circles of equal diameters parallel to each other, and holding the places of the stereoscopic pictures, the field of view then at the distances mentioned were as follows:—

At 22in. from the lenses the field of view was a circle of 5in. diameter; at 18in., 4½in. diameter; at 15½in., 4in. diameter. The largest circle, a lenticular prismatic stereoscope, the distance being from the lenses 6in., would include in its field of view, I found to be one of 2½in. in diameter.

As natural vision is bounded by a circle, to obtain all the beauties of stereoscopic pictures, they should be circular, and to exclude all impression on the eye except that of the picture, sliding telescopic tubes should be connected with the eye-pieces, which tubes might be adjusted by being moved towards the picture, &c.

It seems almost certain the field of view of an achromatic stereoscope will be greater than that of single convex lenses, but that I am unable to ascertain by experiment, not having simple convex lenses of the focus aforesaid.

JOSEPH BELL.

MELHUISH'S PRINTING PROCESS.

SIR,—It is with some pleasure that I reply to the letter of "Subscriber," published recently. His objections are so reasonable, that, though expressed only by one, they have probably occurred to many, and but for the very decided views I entertain of the value of time and space, I should have anticipated them. I can readily believe that "Subscriber" has succeeded admirably, without the trouble of washing. I have done the same myself; indeed, it is easier to tone when the silver is not washed from the print. Then why wash? And why fix previously in hypo.? *Because*, unless we do so, we are *apt* (especially in warm weather) to be troubled with the "abominable yellow:" and, moreover, by washing off the unaltered chloride of silver, we regain more than half the silver used in sensitising.

Again, "Subscriber" asks, or rather hints, why, if so anxious to wash the silver from the print, do I add it to the toning bath? Because the little I add accelerates the action of the bath, and yet is not sufficient to make the lights yellow. The reason I fix in hypo. after soda gold bath is, because I have found that unless the prints are so fixed they darken slowly by exposure to the light.

The method of printing that I recommend in my paper on the subject, is not the result of a few carefully-conducted experiments, but of years of experience, and it will be found that not one precaution there urged can be safely dispensed with.

A. J. MELHUISH.

TO CORRESPONDENTS.

M. B.—The enamel to which you allude on iron vessels and registers, is composed of the same ingredients as porcelain, and is fused on the metal in a kiln. A white enamel is composed of two parts of ground glass, two of calcined tin, and one of borax, all fused together, and poured into water when taken from the furnace. It is then ground in water to a paste, and applied to the metal with a brush. The iron must be scoured clean before this enamel paste is put on, or it will crack off easily afterwards. Calcined lead, employed as a flux in the enamel paste, enables it to fuse at a low heat; but it never should be used in culinary or photographic vessels, as it is poisonous, and liable to be decomposed by vegetable acids. The red, blue, green, and other coloured enamels, are formed with mineral oxides, such as oxide of iron for black, oxide of copper and chromium for green, oxide of gold and manganese for purple, and pure oxide of gold for a beautiful red.

GUN-COTTON.—When *parts* are mentioned in a formula, it means, that any quantity may be taken as *one part*, to suit convenience; the different quantities will then be obtained by multiplying this amount by the number of parts required; *e. g.*, in the formula you quote, where the bath is recommended to be made of distilled water, 100 parts, and nitrate of silver, 10 parts—you may use respectively 100 grains and 10 grains; 100 ounces and 10 ounces; or, 100 pounds and 10 pounds, according to the quantity of bath you require.

A WELL-WISHER.—The only way in which good life-sized portraits can be taken, is by taking small negatives in the first instance, and then magnifying them afterwards to the required dimensions in a copying camera.

W. WAY.—The best plan is to cut a piece of sensitive paper to the required shape, allow it to darken in the light, and then fasten it on the back of the negative. You can also use the mixture recommended in vol. I. p. 83 for this purpose.

C. C. W.—A few grains of metallic zinc or cadmium, placed in the bottle of old red collodion, will, in a day or two, restore its colour. and, to some extent, its sensitiveness. Complete restoration cannot be effected.

J. DRAKE.—1. If you will forward to us a description of the apparatus (with a drawing, if necessary), we will give an opinion on its merits. 2. We will set the matter alluded to right the first opportunity.

BLACK TIPS.—Positives may be taken out of doors, with the sun on the sitter, but the shadows are always abrupt and hard as compared with pictures taken in diffused light.

ANTI-HYPO.—1. We have seen excellent specimens by the process named. 2. A piece of camphor as large as a pea will be sufficient to preserve half a pint of solution from becoming mouldy.

J. J. B.—Our correspondent's valuable communication is received with many thanks. Apply to Negretti and Zambra, Hatton Garden.

T. K.—We are much obliged by your communication. The pictures shall be sent.

ENQUIRER.—We will forward your queries to the correspondent named.

INQUIRER.—We are unable to say at present.

J. W.—We cannot insert your query. There would, of course, be no effect.

Communication declined with thanks.—Photos.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—Alec.—Burr.—F. O. Y.

IN TYPE:—R. L.—Jex.—W. W. Burnand.—M. N. P. S.—H. R. R.—Oxoniensis.—Half-pay Major.

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 71.—*January* 13, 1860.

THE FOTHERGILL PROCESS.

REFUTATION OF MR. KEENE'S CONCLUSIONS RESPECTING THE WASHING OF FOTHERGILL PLATES.

It was not my intention to occupy space in "The Photographic News," by further discussing the best method of preparing "Fothergill" plates, but Mr. Keene's communication in the number of the 23rd December has compelled me to change my intention. As this subject is one of great importance to all dry collodion workers—the number of whom increases every season, I am not sorry this discussion was commenced, for it gives us an opportunity of seeing how far the experience of one photographer agrees or clashes with that of another, and how much latitude may be allowed in conducting the various operations as may best suit the convenience of operators, without materially affecting the results. But that such a useful end may be satisfactorily attained, I would caution all those who send communications to your influential and largely-circulating journal, to be very particular that every fact and principle stated by them is *well authenticated*, and that they recommend nothing but what *long and careful experience justifies*. I know of nothing more culpable than the conduct of that photographer who, either from an insane desire "to see himself in print," or from a fondly-cherished notion that he is destined some day to be a burning and shining light in the photographic galaxy, parades his name in full capitals before the public, makes no scruple of leading astray, and wasting the time, money, and energies of many a poor, credulous tyro earnestly struggling for success. The remembrance of the many failures and almost endless disappointments they themselves met with at the commencement of their career, should be sufficient to deter every photographer from throwing any obstacles in the way of those who may be courageously, though perhaps almost hopelessly, battling with the complex difficulties attendant on their favourite pursuit. I cannot believe that any fellow-worker would be guilty of such criminal and unjust conduct willingly; but if what is stated be erroneous, the disastrous consequences are the same, whether it is done intentionally, or arises from not sufficiently testing the conclusions arrived at.

Though I here make these remarks, I do not suppose they will apply to the gentleman whose communication I am about to notice. Mr. Keene has certainly constituted himself "the champion of the Fothergill process," and has done more than any other man to bring its merits before the public, and therefore any communication on the subject proceeding from his pen should receive careful attention. And it is in consideration of the great influence which justly attaches to his name, as well as to justify the principle advocated in my former communications, that I now venture in a friendly spirit to correct an error into which he has evidently fallen. Before doing so, I may just observe here, that another writer has charged me with propagating "assumptions which, if followed, would only tend to disappointment and disgust,"—certainly a very agreeable compliment, and, were I disposed to retaliate, it would not be difficult to repay him in the same coin. But I will only remark, that it would have been more to the purpose had he proved the incorrectness of my reasoning, by better logic than wholesale condemnation, and permitted himself to believe that the experience of his brother photographers might possibly be as extensive, as valuable, and as conclusive, as his own.

But a truce to this digression. Mr. Keene has undertaken a series of experiments to determine the comparative influence of different quantities of water used in washing the plates on their *sensitiveness*. These experiments, he intimates, were undertaken to prove that I was in error in recommending the whole of the free nitrate of silver to be washed from the plates when intended to be kept. But do the experiments, as he has detailed them, really prove that I am wrong, or do they meet the case at all? If Mr. Keene will refer again to what I stated, he will see that I did not deny the fact, that a certain portion of free nitrate increased in some measure the sensitiveness of the film; though I certainly did not, and still do not believe, for reasons I will give presently, that it increases, or rather that its absence diminishes, the sensibility to the extent Mr. Keene would have us believe.

The first thing which struck me, as it doubtless would others, on reading the account of these experiments, was the enormously *long exposure* given to each of the plates, ranging from *fifteen* minutes' gas light to *ninety* minutes for the most sensitive, and from *nine and-a-half hours*' gaslight, to *four hours of daylight* for those treated with iodide of potassium. For some time I was utterly at a loss to account for exposures of such lengths being required, as, in printing transparencies, I have always found *five to seven minutes*' exposure to an ordinary gas burner amply sufficient, even with plates from which *all* the free nitrate had been removed by washing with an unlimited supply of water. But at length, on examining it again, I hit upon—at least, believe I hit upon—the solution. Mr. Keene does not tell us that he added any *silver* to the developing solution, except in one instance, to strengthen a picture which had been previously developed with gallic acid. If I am right in this supposition (and I can account for such unusually long exposures on no other ground), the whole of his experiments fall to the ground, and prove nothing. Mr. Keene cannot surely be ignorant that while free nitrate of silver is not essential to the *impression* of an image, it *is* essential to its *development*, and consequently, if it has been all removed in the preparation of the plate, to insure its keeping, the necessary amount must be added afterwards to cause reduction and bring out the image: hence the difference of results in the plates experimented upon is easily accounted for. In the case of those washed with four or six drachms of water only, a portion of silver would necessarily be left in the film, and the development would commence at once, but in those from which it had been all removed, the reduction would depend on the feeble action of the gallic acid alone; and no wonder, therefore, that only the slight trace of a picture should be visible even after it had been submitted to the developer for *sixteen* hours.

Mr. Keene might have far more easily determined the value of free nitrate of silver on the sensitiveness of a plate, by simply preparing a plate in the usual way, and, on removal from the bath, washing it well in distilled water, and exposing at once in the camera. The exposure in such a case would be about *half as long again* as that required for an *unwashed* plate in the same circumstances; but of course to develop it, free silver must be added to make up for that which had been washed away. If this is the case in the *wet* process (which any one may easily prove), why should we suppose the sensitiveness diminishes in a different and greater ratio in the case of *dry* plates? All my experience in working dry processes (which, without egotism, I will venture to

say has been as extensive as that of most photographers). has tended to show that the ratio is precisely the same.

But, whether I am right or wrong in supposing that Mr. Keene omitted to add silver to his developing solution, the conclusions forced upon him as the result of his experiments, should have convinced him at one glance there was something wrong about them. Let us see how they look when reduced to actual practice. If double the quantity of water be employed to wash the plates, that is, *eight* drachms instead of *four*, for a stereo. size, Mr. Keene tells us we must give *five* times the length of exposure. My operations are chiefly confined to plates 10 × 8. For this size, according to Mr. Keene, *two ounces* (speaking in round numbers) would be the proper quantity to wash off the silver, and the exposure to a landscape on a bright day with a Ross single lens, half-inch stop, would be about *five* minutes. But if, to insure better *keeping* properties, I use *four* ounces instead of two I must expose, in the same circumstances, *twenty-five* minutes. Did any one ever hear of dry plates of that size, *however prepared*, being exposed twenty-five minutes in full sunshine?

But that is not all. If I use an *unlimited* quantity of washing water, and remove the *whole* of the free nitrate, I must expose 200 *times* as long as in the first instance, or, in other words, 16½ *hours!!* Verily, the thing seems like a joke, and I am surprised such a glaring error should have escaped Mr. Keene's observation. I can here only state again, and I do so emphatically and without ambiguity, not wishing in the least to deceive or mislead any of my photographic brethren, in which I could have no possible interest, that I have obtained with various collodions *many dozens of perfect negatives* 10×8 on plates, from which all free nitrate of silver has been removed by first washing in a bath of distilled water, and then under a tap for *four* minutes *previous* to applying the albumen, the *exposure* of which has ranged from *five to seven* minutes, according to light and the nature of the subject.

But, in treating of this matter, Mr. Keene seems almost, if not entirely, to lose sight of the important fact that dry plates, if they are to be of any real value to the majority of photographers, require something more than a moderate degree of sensibility, viz., the property of *keeping* a considerable time. It matters not how sensitive a dry plate may be, if it will not allow us to take a tolerably long excursion, and remain unimpaired until we can return home to develop it. It would be but a small consolation to a toiling amateur, after having succeeded in taking a stereogram in a few seconds, to find on developing it, when far away from the spot, nothing but a mass of stains and general decomposition; it would, as Mr. Melhuish quaintly remarks, be a "negative" in the proper sense of the word.

If photographers were always in a position to prepare their plates in the morning, and develop them on the evening of the same day, then, as I stated in my former communication, Mr. Keene's method would, no doubt, be an advantage. But we know the majority of amateurs, when on an excursion, cannot do this (unless they are at the trouble of taking all their chemicals and bottles with them, which is the very nuisance dry processes are intended to obviate); consequently, they must have recourse to some means to make their plates keep a longer time. To accomplish this, no less an authority than Mr. Hardwich, in his 4th edition of his "Manual," at page 103, informs us, "The quantity of free nitrate of silver left upon the film must be reduced to a *minimum*, if the thermometer stands higher than usual." And it is singular and surprising that any one having had even but a limited experience in working dry processes, should not have found ample cause to lead them to acquiesce in the truth of this statement, and that such experience should not also have confirmed the well-established fact (likewise stated by the same authority), that free nitrate of silver left in the film rapidly hastens, especially in hot weather, its decomposition, and renders it totally useless.

This, then, and nothing but this, is what I have always advocated, and still advocate, in the full conviction of its truth, and on the undeniable testimony of careful demonstration. But it is with regret that I am thus compelled to differ with such an able photographer as Mr. Keene, and to fly in the face of the more imposing authority of Mr. W. H. Jennings. It is, however, gratifying to myself to find a statement recorded in your Liverpool contemporary, made by a member at a recent meeting of one of the London societies, to the effect, that in a conversation he had had a few days previously with Mr. Fothergill, the *discoverer* of the process, that gentleman stated that he now used an *unlimited* quantity of water to wash the plates before applying the albumen. A humble individual, therefore, like myself, can afford to hold opinions which are sanctioned by such an unquestionable authority.

Before concluding, allow me to express a hope that the forthcoming Exhibition of the Photographic Society will be rich in specimens of this most excellent process. Last year it was totally unrepresented, and many photographers had taken occasion from this to doubt its capabilities, and the followers of Taupenôt sceptically to ask for some proofs of its pretensions to vie with their own beloved process. Such "proofs," I therefore hope, will no longer be wanting, but that henceforth a demonstration will go abroad which shall teach these devoted disciples that if it cannot surpass, it can yet fully equal, their proudest productions; and which shall convince the pitiable but tenacious toilers in wet collodion, that, with all their unnecessary trouble, they cannot eclipse, if they can equal, the charming results of a far simpler manipulation.

January 2, 1860. M. N. P. S.

ON THE LUMINOUS INTENSITY OF DIFFERENT PARTS OF THE SOLAR DISC.

The following is the substance of a letter addressed by Professor Secchi to M. Elie de Beaumont. He says:—

"The discussion which has been raised by M. Faye, on the existence or non-existence of a transparent solar atmosphere, affecting a subject in which I have made some researches ulterior to those already presented to the Academy, I ask permission to recapitulate them here, the subject being highly interesting, on account of the approaching eclipse.

"After the observations on the solar temperature in different parts of the disc referred to by M. Faye, I made others with the large equatorial of Merz, which, being a more powerful instrument than that of Cauchois, gave more exact results. In a series made on the 8th June, 1855, the projected image had a diameter of 220 millimètres, and the thermo-electric pile a square opening 1° millimètres across.

"Here are the temperatures observed at different distances from the centre measure in millimètres on the image:—

Distances from the centre ...	0 (centre)	10	30	50	70	90	104
Intensity in degrees of the multiple	50·1 (a)	50·2	50·0	49·8	48 9	46·8	44·4
Proportional degrees	121·0	122·2	120·0	119·0	114·0	101·5	85·5

"The intensities have always been observed in four symmetrical points placed on the two orthogonal diameters. At the centre we have a trifle less, because there was a small spot very near it. We see here the progress of the feeble diminution near the centre, and up to $\frac{3}{4}$ of the radius, but which, at $\frac{1}{12}$ of the radius, becomes only 0·7 of the central zone. But the large opening of the pile concealed, to a great extent, the real diminution of the intensity. For this reason I made another series of experiments on the 12th of June, giving to the image a diameter of 330 millimètres, and to the pile an opening of four millimètres only. The following table shows the diminution observed, always operating in four distinct points:—

Distances from the edge in parts of the radius	1 = centre	$\frac{7}{16}$	$\frac{1}{15}$	$\frac{1}{32}$	of the radius.
Galvanometrical degrees	40·6	38·5	36·2	28·9	
Proportional degrees	71·0	63·5	57 0	36·8	
Relation of the intensities	1·00	0·89	0·80	0·52	from that to the centre.

"The opening of the pile corresponding to a zone at the edge 24 seconds in width, we see that on this extreme zone, quite round the solar disc, the calorific force is half that of the centre, and it would be found to be still less nearer the edge if we could try the experiment. This confirms all that I have discovered since 1852: when also I showed that Laplace's theory was inadmissible, and I even calculated the proportion of heat which the solar atmospheric envelope absorbs, using for this purpose the formula given by M. Plana in the *Astr. Nach*, 813.

"The results obtained with regard to heat agree in great part with the latest observations of M. de Chacornac on the intensity of the light; and I take the liberty of recalling that I had myself arrived at the same conclusion, by employing the same double image prism, as regards finding the light at the sun's edge almost equal to the penumbra which surrounds the spots. I found also that the faculæ which appear so brilliant when they are at the edge, are not, in fact, more luminous than the centre of the disc.

"I believe that the greatest difficulty propounded by M. Faye is, in fact, that drawn from the clearness with which we see the details of the spots, which appears difficult in admitting an atmosphere, as happens, indeed, with the planets. But I would remark, in the first place, that provided the atmosphere be transparent,* we may always see very well through any thickness whatever, especially taking into account the immense solar intensity; only, near the edge, we should find it more difficult to seize details, which does, in fact, happen, for I have never succeeded in seeing near the edge those light, reddish, misty appearances, or *cirri*, which I have almost always seen on the large spots at the centre of the disc. I even believe that the bad definition of the spots, which is so frequently attributed to the terrestrial atmosphere, especially near the edges, may be caused by that of the sun.

"Still, M. Faye's objection has great weight, and we might add that if the *corona* expressed the limits of the solar atmosphere, the great comet of 1843 would have passed into the interior of this atmosphere at its perehelion, and I don't yet see how it would have been able to quit it. *En attendant* the arrival of new observations to clear up these difficulties, I have endeavoured to ascertain if I could not find in the moon the cause of some of the phenomena of solar eclipses. The constitution of the lunar surface is not known, and it is not impossible that it might be capable of contributing to some exterior radiations. To ascertain this, I made several series of polariscopic observations, the conclusions from which appear to me somewhat remarkable:—

"1. In the first place, the lunar light is polarised more or less according to the phase: in the full moon, the polarisation is null, the plane of polarisation is that of reflection.

"2. The maximum of polarisation is towards the sixth or seventh day, the moon being at an elongation from the sun of 80° to 90°. At the moment I could not better determine the epoch of the maximum, the season having been adverse of late.

"3. The amount of polarisation in the first quarter is almost the same over all the illuminated face; only, by employing a pile of polarmetrical glasses, we find a slight difference between the enlightened edge and the part which is near the limits of the shadow. A polarmetric pile of three sheets inclined about 45° suffices to destroy all the polarisation of the lunar light in the first quarter. I will occupy myself in giving more exact measures at some future time.

* The atmosphere of planets does not polarise the light: is it analogous to our clouds?

"4. The amount of polarised light on the mountains is almost nothing; that, on the contrary, of the so-called *seas* and in the hollows of the craters is very considerable; the white of the mountains stands out very clearly on the coloured ground of Arago's chromatic polariscope.

"The fact of this polarisation is not so simple as it appears at the first glance; in fact, the polarisation in the plane of the reflected rays always supposes a *specular* reflection, and the simple diffusion of a rough, uneven object like ordinary stones could not produce it; but if we examine the polarisation by reflection on a curved surface, we find a very different amount of polarisation, according to the particular incidences of each ray, the curved surface being equivalent to an infinity of plane surfaces under different inclinations, and capable of polarisation in different proportions. On the contrary, on the moon we find the proportion of polarisation almost equal, notwithstanding all the differences of inclination of the spherical surface; the differences which exist are only appreciable by the most delicate methods, and the eye alone would see nothing of it. We should conclude from this, it seems to me, that the lunar surface does not polarise like a uniform reflecting surface, but rather like a mirror surface, in which we always find a small plane inclined in the exact degree requisite to return a similar proportion of polarised light under the general angle of reflection of the rays. Its effect is precisely identical with that which a curved surface produces covered with glass paper (such as is employed in the arts), and this is the most perfect imitation which I have been able to find. Also light reflected from trees with supple leaves, irregular heaps of crystalline substances, and especially of volcanic sands which shine with a great number of rays reflected by the sheets of mica and crystalline sand, produce the same effect. The analogy of this latter fact with what we know of the moon, is striking. The photographic and photometric observations made during the day cause us to see that these shallows of the moon are in reality very slightly reflecting, not more, perhaps, than black sand.

"Now, might it not be that this mirror-like constitution had some share or influence in the *corona* on the occasion of the solar eclipse? *Savants* will judge.

"M. Le Verrier having invited research for the planet inferior to Mercury, we have examined the numerous designs of solar spots made from last year up to the present, almost every day, and, although we have found several small spots disappear between one day and another, we have seen nothing which could by any possibility be taken for a planet. If we consider the great rarity of the transits of Venus and Mercury, we shall see that it would be a great chance to find a planet in this way."

GENERAL OBSERVATIONS ON PHOTOGRAPHIC POSITIVES.

BY MESSRS. DAVANNE AND GIRARD.

OF FIXING.

Definitions.—To fix a photographic proof is, in the absolute sense of the word, to render it permanent and unchangeable in its appearance and quality. To attain this end, the photographer, taking the proof from the printing frame, submits it to the action of different solutions, but related to each other by the dissolving action which they exercise on the argentiferous compounds insoluble in water, which constitute the impressionable film. This operation is accompanied by three different kinds of sensible phenomena: the parts of the proof not acted upon by the light, but which would darken on exposure to it, are rendered colourless; a change is invariably observed in the coloration of the print; and, finally, the intensity of the tones which clothe it is frequently diminished.

From these three points of view, the fixing, to be perfect, ought to present clear and definite qualities:—

1. The fixing agent ought to remove from the paper all

the sensitive substance not acted upon, in order that a subsequent action of the light may not intervene to modify the effect produced.

2. It ought not to leave any substance on the print capable of reacting, either immediately or eventually, on the elements which constitute it, and so altering its different parts.

3. It ought not to exercise its action on any other parts than those which have not been acted upon by the light; or, at all events, if it does attack the coloured parts, it ought to do so but very feebly, in preserving all the softness of the half tones.

A small number of substances are employed with variable success in accomplishing this object; we shall examine in succession the value of each of these from the three points of view indicated; but, before we do so, we will endeavour to establish the theory of the fixing itself.

Theory of Fixing.—When the photographer removes from the printing frame a print, it is generally covered with rich violet or purple tones, formed of different substances, the nature of which, thanks to our previous researches, is well known to us now. In the first place, we have free chloride of silver, likewise free nitrate of silver, which are in excess, on which the light has not acted, and which, consequently, do not belong to the coloured parts of the proof. In the next place, we have, as we have shown, metallic silver, and, more especially, that organico-silver combination of variable coloration, the influence of which is great in the production of the proof.

The different nature of these four substances causes them to act very different parts in respect to the fixing agents. As to the two first, they undergo, under their influence, actions, the nature of which we propose to elucidate. All chemists are agreed on this point; the fixing agents remove the salts of silver unaltered by the light. But the same accord is far from existing relatively to the part played by the fixing agents in respect to the coloured parts of the proof. This discordance is easy to understand.

The operation of fixing is, indeed, accompanied by a remarkable fact, with which all photographers are familiar. At the moment when the proof is immersed in the fixing bath, whatever it may be composed of, it is speedily deprived of the violet tint which covers it, and assumes a red-brick tint, or an orange-red tint, varying according to the nature of the fixing solution, but all differing in the clearest and most essential manner from the primordial tone of the proof. This remarkable fact must inevitably have struck observers; it is so salient, that we can readily understand the ardour with which different explanatory theories have been proposed.

The first which was proposed was this: the proof is formed of a sub-chloride of silver, Ag_2Cl, that the fixing agent decomposed and converted one part into soluble chloride of silver, and the other into metallic silver, which forms the proof. This theory is no longer tenable, for, on the one hand, we know that the positive proof does not contain sub-chloride of silver; and, on the other, it seems difficult to admit that the metallic silver precipitated can vary, not in the intensity of the tones, but in their very nature.

From the day it was understood that among the organic matters constituting the sheet of paper or covering it, there was one which influenced the results, they sought in the modifications which these would be made to undergo the basis of theories, ingenious, it is true, but which had not the sanction of experience.

Some said, the fixing agent decomposes the sub-chloride of silver, Ag_2Cl, the silver is liberated, and, uniting itself to the organic matter, forms a coloured combination which constitutes the proof. This modification of the first theory is not more admissible than it. For, 1st, the sub-chloride of silver does not exist on the proof; 2nd, we have shown that the organico-silver combination existed *before the fixing agent had intervened*, when the light alone had acted. In fact, the coloured precipitate formed under the influence of the luminous action in a solution containing chloride of silver, nitrate of silver, and starch or gelatine, contains organic matter rendered insoluble before being submitted to the action of any reagent whatever.

Others say, the organico-silver combination existed before the action of the fixing agent, because, according to the nature and the strength of the size, the proof clothed itself in the printing frame in different colourings; but, under the influence of the fixing agents, the combination is destroyed, and the metallic silver is liberated. Like the two first, this theory is inexact. We have shown, on the one hand, that the organico-silver combination *still subsists after the action of the fixing agent*, for the precipitate of which we have spoken, fixed and well washed, still contains organic matter; on the other hand, a proof taken on unsized paper—that is to say, containing scarcely anything beside metallic silver, is grey after fixing, and not red, as it would have been if the silver had found itself in presence of a size. Hence, the organic matter subsists in combination with the silver.

These theories do not, then, account precisely for the marked change of tone which characterises the action of the fixing agent. It is, indeed, in a totally different order of ideas that we must seek for the cause of this phenomenon, as we propose to show.

When it is considered that, if the image contains metallic silver, this only serves as a canvas, and constitutes, so to speak, a flat tint, on which the organico-silver substance comes to group itself in vigorous and coloured tones, one is led to seek, in a modification of this, the cause of the change of tint produced by the fixing agent. Now, if we reflect on the nature of the fixing agents employed—hyposulphite of soda, ammonia, cyanide of potassium, &c., we remark that all possess an alkaline reaction; we know, besides, that the alkalies possess the property of swelling, that is to say, of hydrating the substances which usually form the size of papers, and especially starch. Starting from these observations, we have been led to think that at the moment of immersion in the fixing agent, this exercises on the size an alkaline reaction, swells it out, and causes the organico-silver combination, already formed by the action of the light, to undergo an hydration which energetically modifies its colour. In this case, be it understood, we desire to speak of a chemical hydration, and not of a simple moistening, for the new compound thus formed possesses a colour proper to itself, which it does not lose on desiccation.

If the above hypothesis is found to be just, one fact ought easily to establish its exactness. It was, in fact, easy to find in the vapour of boiling water a substance which, incapable of operating a chemical decomposition on the salts present, could, nevertheless, exercise on the size the same swelling action as an alkali. And, hence, it ought to follow that in exposing to the vapour of boiling water a violet proof on starched paper just taken from the printing frame, it should assume the red tint which it would have assumed had it been immersed in a solution of hyposulphite of soda or ammonia. Plunged in boiling water, it ought to behave in the same manner; but, immersed in cold water, it ought not to manifest any sensible change, for cold water does not sensibly swell starch.

Experiment has demonstrated the reality of these facts. A proof on paper, sized with starch, taken from the printing frame, and immersed in cold water, does not change its tone; but it becomes red immediately it is immersed in boiling water, or if it be merely exposed to the steam which rises from it.

This theory is, besides, confirmed by several observations. If starch only becomes hydrated under the influence of hot water, gelatine, as is well known, does so, eventually, under the influence of cold water. Therefore it is easy to explain the interesting fact which Mr. Arnaud communicates to us, that proofs on English paper—that is to say, sized with gelatine, tone themselves to a red if they are left for a long time in cold water. In this case the cold water plays the same part, with respect to the gelatine, as the hot water does to the starch.

Besides, we have convinced ourselves that all the salts of a

feebly alkaline reaction, such as the phosphate of soda, borax, &c., act in the same sense as the fixing agents, although with much less energy.

Thanks to the facts we have exposed, the theory of fixing them is established in a manner which presents great guarantees of certainty. The fixing agent dissolves the argentiferous salts, whether chloride or nitrate, in excess on the paper; it exercises no action on the metallic silver if it be employed in a manner which we will term normal—that is to say, at a time and in a state of concentration such that none of the accessory reactions which we shall shortly examine are produced; in short, it causes an energetic change of tint in the proof due to the hydrations, under an alkaline influence of the size, and, consequently, to the combination which this forms with the silver. A direct experiment may demonstrate clearly in what manner the organico-silver substance swells and becomes hydrated under the influence of alkalies. If we collect the matter deposited in water, holding a little starch in solution by a mixture of chloride and nitrate of silver, and having fixed it, we leave it in free air till it becomes desiccated, and then mix it with any fixing agent, it will be observed to increase in bulk very much, and its tint to become slightly changed. Hydrated the first time by the fixing, the substance had become partially desiccated, but the second contact of the fixing agent distended it anew.

We will now examine the relative values of the fixing agents and their peculiarities.

Action of the different Fixing Agents on the Proof.—The agents employed for fixing positive proofs are the most energetic solvents of the salts of silver; among them there are only three which need occupy our attention; these are—hyposulphite of soda, ammonia, and cyanide of potassium, the last of which requires but a brief consideration, for its solvent properties render its use too dangerous. To use these fixing agents, they are dissolved in water in different proportions, and in the solutions thus prepared the print is immersed on removal from the printing frame. Frequently—and a very good plan it is, as we shall see shortly—the operator, before immersing the print in the fixing solution, washes it in water, in order to remove the free nitrate which it contains, and to leave nothing in contact with the fixing agent but the chloride of silver.

Without being, strictly speaking, itself a fixing agent, water plays a part in the fixing; and therefore we must, before proceeding further, examine if this liquid really fulfils the object proposed—that of dissolving all the free nitrate of silver. Now, if we immerse a sheet of paper in a solution of nitrate of silver, and, without exposing it to the light, endeavour to remove the argentiferous salt by washing it in distilled water, we shall find that, though a considerable quantity has been removed, there is still some left. The paper, no matter how long the washing may be prolonged, will assume an uniform grey tint on exposure to the luminous action, which indicates a reduction of silver. No doubt a part of the nitrate of silver, being decomposed by the salts which the paper always contains, forms an insoluble argentiferous compound in the body of the paper, which is subsequently attacked by light; but the quantity of free nitrate which remains after the washing is so small that the advantage of employing the water before immersing the print in the fixing bath is incontestable. Water, however, does not constitute a fixing agent when used alone, not even when the paper contains nothing but soluble salts, as has been pointed out in a process recently published.

(*To be continued.*)

ON NEGATIVE IODISERS.

BY WENTWORTH L. SCOTT, ESQ.

For many purposes, when *sensitiveness*, without *hardness*, is required in a negative collodion, the iodides of magnesium and barium are specially adapted; and, although my experience in their use is certainly of not very long duration, I am induced to make a few remarks on my formulæ, in the hope that some readers of "THE PHOTOGRAPHIC NEWS" may try the same, and hereafter give their results for the benefit of all.

The iodide of barium being difficult to procure at any ordinary photographic warehouse, and not to be bought *pure*, I generally prepare it in the following simple manner:—Pure hydrate of baryta—equal, in quantity, to about two-fifths of the iodide required—is dissolved in hot distilled water, but *without saturating* the same, and finely-powdered iodine gradually added in slight excess, or until the yellowish-brown colour it communicates to the liquid no longer disappears on heating and agitating. The solution may be evaporated to a quarter of its bulk when iodate of baryta crytallises out, as it cools, in beautiful circular tufts. The mother-liquor yields a further supply upon additional concentration. The crystals, when carefully dried, may be cautiously heated to dull redness, in a small porcelain crucible; and, after a time, if a little chip of dry wood no longer scintillates when touching the mass, the operation should be completed by dropping in a small lump of iodine, and, when the latter is entirely dissipated, allowing the whole to cool. The mass may then be weighed, and dissolved in the requisite quantity.

Iodide of barium may also be obtained by agitating finely-powdered iodine in water, and passing a current of sulphuretted hydrogen through the mixture until the colour disappears, when the liquid must be heated until the odour of the gas is imperceptible, filtered, and *nearly* neutralised with hydrate of baryta. The solution, after evaporation, yields crystals of the salt required. As the baryta usually met with contains some few impurities, it is better not to evaporate to dryness and extract with alcohol, but to *crystallise*, as previously directed.

The following will be found a good formula for a barium iodiser:—

Alcohol (80 per cent.)	... ...	1 fluid ounce.
Iodide of barium	... ...	12 grains.
,, potassium	... ...	8 ,,

Add to collodion in the proportion of 10 to 13 per cent., according to its consistence, the strength of the nitrate bath, &c. I would especially recommend the above for architectural subjects.

Iodide of magnesium may be prepared in two ways for photographic use; I give the preference to the first-named:—

1. Dissolve 60 grains of *pure anhydrous* sulphate of magnesia * in a small quantity of distilled water, and add it to a solution of iodide of potassium, containing 190 grains of the pure dry salt. Evaporate the whole to dryness, and extract the residue with (according to the strength of iodiser required) from 8 to 10 fluid ounces of *absolute alcohol.*

2. Solutions (aqueous) containing, respectively, 196 grains of iodide of barium, and 60 grains of sulphate of magnesia—both salts being weighed *dry*—are mixed together, and the resulting precipitate (sulphate of baryta) separated by filtration. The clear liquid, after an addition of 23 grains of iodide of potassium, is evaporated to dryness, and the remainder treated with alcohol as before.

Iodide of magnesium should never be used *alone* as an iodiser, but in conjunction with a little of the potassium salt, as arranged in the preceding formulæ. Iodide, or better, bromide, of cadmium, is also a useful addition. If

Iodide of magnesium	... ...	10 grains
,, potassium	... ...	9 ,,
Bromide of cadmium	... ...	4 ,,
Sylvic acid †	... ...	8 to 10 ,,

are dissolved in an ounce of alcohol (80 per cent.), and used for iodising a good collodion, of rather porous structure, very excellent results may be obtained; foliage and distant hills are delineated with a peculiar softness, and the process, besides, has some of the advantages of a "dry" one, as the

* Obtained by heating the crystals until they fall into a dry white powder.

† Extracted from resin by means of alcohol.—*Fownes' Manual.*

plates may be used, even a day or two after sensitising, without the necessity of greatly increasing the time of exposure. For dark objects, where detail is wanted, the sensitiveness may be increased, by plunging the plate—for 10 or 15 seconds—into a bath of nitrate of lead, of the same strength as the silver one, after its removal from the latter.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

A background for a soldier may be formed as a rampart, with gun, cannon-balls, &c., and would be more to the purpose than leaning on a chair, or sitting on a sofa. These adjuncts to a picture are well worth the attention of all the operators in large and populous towns, as the backgrounds

we describe, and give slight sketches of, can be easily and cheaply got up, and varied according to the skill or cunning of the operator; and those parties first adopting this plan would soon find an increase in their business. A castle in the distance, with storming party, &c., could be introduced; or a drum, stand of arms, and the colours, could be grouped at the side, painted on the flat, or modelled in paper and wood.

POSITIVE PRINTING.

In the last number of the "News" there was an article on printing, signed "R.," which the writer affirms to be "superior in every respect" to that which I described some time ago. It is but natural that every operator should feel a liking for that process which he has practised; but nothing helps the art of photography so much as different men giving themselves to a certain branch, and then coming together and forming a common stock of experience. Although I have worked at every branch and process of photography, my greatest study has been positive printing, and this is my plea for making some few observations on "R.'s" article.

On reading his instructions, the first difference betwixt us is, that he adds one minim of glacial acetic acid to each ounce of albumen. As one of our chemists affirmed, this acid simply coagulates a certain quantity of albumen, and years of experience have shown me that it is utterly useless. Adding 15 grains of salt (my method is 10), he states, is a great advantage, as, "if less salt is used, the prints are liable to turn red in the hypo. fixing bath." This is certainly a mistake, which I can and have proved hundreds, perhaps thousands, of times. About the best albumenised paper in the market is that of one of the oldest London firms, which they state, and I have certified, to be salted only to the amount of 6 grains to the ounce. Again, the general complaint is, the blacks are too blue (not red) in using the gold as stated, and this is the only care needed to prevent the action of the gold from going too far. If 15 grains of salt, however, are used, 75 grains of silver ought to be added to each ounce of the bath. But as to a long floating injuring the brightness of the print, I can again state, that any time up to ten minutes does *not* act so.

Washing the printed proof in six or eight waters is necessary if a small quantity of water is used, as "R." recommends, but one or two waters will do all the work needed if more is added.

As to ammonia solution, or salt, being used before immersion in the gold, I prefer ammonia, as the slight film which the salt forms on the surface of the albumen has no chance of being removed before going into the fixing bath; but the ammonia forms no such coating, and so the gold does its work better.

"R." states that he "shows" (he should say "states") 20 or 30 grains of carbonate of soda is "wrong in principle, and injurious in practice." Firstly, he states, that it "acts injuriously on the organic part of the silver image." I believe he is wrong here. But what is the action if it does? As to it "dissolving the size of the paper" (though I doubt it), he could give it no higher praise; as many of the best French operative chemists affirm, *that no print can be fixed without removing the size from the paper.*

These are the differences betwixt "R.'s" process and that described by me; and let it be fully understood that I have not the slightest doubts of the good results of the former; but when he states that the pictures are superior to those printed by my process, I must turn *egotistic*, and tell him, that almost every review has quoted my prints as "first-rate," "really excellent," &c.—and this when exposed in the best exhibitions in the United Kingdom. More than this—as to goodness of printing, I challenge England to produce *better* or *more* brilliant pictures than this process will give (though scores of manipulators get quite equal results); and, as to *permanency*, they are, to say the least of it, quite as certain as those by any process.

Twelve or fourteen years' unbroken study of the subject gives me a confidence in stating my experience, which may appear dogmatic to "R." and others; but when any man has spent the time in experimenting and working which I have done, they will receive convictions which they will feel no bashfulness in stating. O

Photographic Chemistry.

CARBON—(*continued*).

Coal, which is calcined in a vessel from which the air is entirely excluded, yields a carbon known as coke, which present different appearances, according to the kind of coal employed In some cases it undergoes partial fusion, and the coke has a somewhat brilliant metallic appearance, which does not at all resemble the coal from which it was made; while in the case of anthracite scarcely any alteration is observable either in appearance or weight.

The best kind of wood charcoal for chemical purposes is that obtained by burying a piece of boxwood in sand in a crucible, and heating it intensely for a considerable time after all appearance of flame has ceased on the surface.

Carbon, under these different conditions, presents widely different physical properties—its densities varying considerably; for instance, the density of the diamond is 3·50—that of graphite

2·20—while the density of pulverised coke varies from 1·60 to 2·00. The density of charcoal depends on the degree of porosity of the wood from which it is prepared. If we throw a piece of charcoal into water, it will be seen to float, and we might at first imagine that its specific gravity is less than that of water; but we can easily show that this effect is entirely due to the hollow pores of the charcoal. We have only to reduce it to a powder, and we shall then find, if we throw it on water, that it will sink to the bottom.

Common charcoal is a bad conductor of both heat and electricity; but, if it be subjected to intense calcination, it becomes a good conductor. It may be partially caked together by placing it between the poles of a pile of about 500 elements; and the appearance it then presents is the same, whatever kind of charcoal may have been used. The very porous kinds of charcoal possess the property of absorbing a very large proportion of gas, in the case of ammouiacal gas ninety times its own volume, and giving out these gases on being immersed in water, more especially when the water is boiling. If we transfer a piece of porous charcoal from a vessel of sulphuretted hydrogen, where it has been left for some time, into a jar of oxygen, the charcoal will become hot, sulphur will separate, and water and sulphurous gas be formed. The combustion is so sudden sometimes as to cause an explosion. Similar phenomena present themselves in the case of other combustible gases. Probably, in some degree connected with this property is the property it possesses of depriving putrid substances of their disagreeable odour. Water which is unfit to drink, by reason of its putridity, may be sweetened by dropping into it a few pieces of red-hot charcoal; and, when wooden casks are used for holding fresh water on board ships, they are charred inside. We believe that it is a very common practice to employ pounded charcoal for filtering purposes, and that filters are sold which are termed charcoal filters. Now, while we have not a word to say against the use of charcoal for such a purpose, we would advise our readers not to drink the water drawn from one of these filters without first leaving it for some time in contact with the air; as, in the passage of the water through the charcoal, this substance deprives it of the air it held in solution, and thereby renders it less agreeable to the taste, and less wholesome.

Charcoal burns in the air, and is converted into carbonic acid gas, the trifling residuum which remains in the form of ash consists of impurities, such as earths, salts, alkaline, or metallic oxides. Its combustion is much more vivid iu oxygen, and is so dazzling that the eye can hardly bear it. It is easy to ascertain that an acid gas is found in the jar in which it is burnt, by pouring into it a small quantity of blue solution of litmus, which becomes red. If a little lime water be poured in instead of the above solution, it will assume a milky appearance, and yield a precipitate of carbonate of lime.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Graduation of glass vessels.—In many photographic operations minute exactitude in formulæ is not imperative, an approximation to the required quantities being sufficient. A habit of laxness in this respect is, however, very undesirable. Not only so, but, in many instances, where extremely active or costly chemicals are in use, the most undeviating correctness is either imperative to certainty in operating, or, at least, very important as a matter of economy. The ready facility for exact measurement is therefore a matter of the very first importance, especially in experimental operations. Unfortunately, here, as in other matters to which we have had occasion to refer, the suddenly extended demand for an article, and the prevalent rage for mis-called cheapness, have induced the introduction into the market of a large supply of graduated glass measures utterly worthless; or, indeed, worse than that, being mischievous from their inaccuracy. We have before us, at this moment, a graduated ounce measure which is marked incorrectly to at least the extent of a drachm; and many others we have seen to a greater or less extent inaccurate. It is important, therefore, for the photographer to be in a position to test and verify his measures in the first place, and then to correct them; or, what is, perhaps, often quite as desirable, to graduate for himself his measures, tubes, burettes, bottles, &c. &c.

Before proceeding to the manipulatory details of the latter process, it may be interesting, as well as important, to give a few moments' attention to the method of determining accurately the capacity of measures. As measurement is determined by weight, it will be necessary, in the first instance, to procure or possess access to correct scales and weights. The standard, or imperial pint, contains twenty ounces avoirdupois, by weight, of distilled water, at a temperature of 62° Fahrenheit. Adopting this as a basis, it will be easy to ascertain the exact volume of as many ounces, or parts of an ounce, as may be desired. The horizontal position of the vessel to be tested, or graduated, should be carefully obtained by the use of the spirit level. If a perfectly horizontal table be not at hand, it will be easy to use a levelling stand, with a glass plate placed on it. When the vessel with the water is in the scale, it will be found convenient to use a small glass syringe to remove any excess, or add any additional water, with some degree of minuteness, and without wetting the sides of the vessel or the scale. One vessel so carefully graduated will serve as a standard for graduating others, and the photographer will find it a frequent convenience to have a number of bottles, for preparations most generally in use, so graduated, so that measuring and mixing may be performed at one operation.

There are several modes of marking the graduations of glass vessels, any of which may be selected by the experimentalist. It may be done by the scratching diamond, by the application of hydrofluoric acid, or by the vapours of hydrofluoric acid. As each method has its own peculiar characteristics, both in manipulation and result, we will describe them.

The use of the pencil diamond, or scratching diamond, as it is often called, is the most simple, easy, and quick method, especially where only a single vessel or a limited number have to be graduated. Its results are, perhaps, generally not quite so neat or regular as those produced by the use of the acid, or its vapours.

Where the diamond is about to be used, the following will be found a convenient method of proceeding:—The vessel, or bottle, should be first laid on its side, in some place where it will remain firm without rolling away when under pressure. Nothing, perhaps, will answer the purpose better than partially embedding it in a vessel containing sand. A straight line is then to be drawn from top to bottom with the diamond, and the aid of a straight-edge. This line is necessary to commence the horizontal lines of graduation from with any neatness or regularity. To aid in accurate measurement the graduation should be marked on both sides of the vessel; and the same process must therefore be repeated on the other side. A narrow strip of writing paper must then be gummed by the side of each line, on its left side when the vessel is in its right position. A place perfectly horizontal and true for the vessel to stand on having been prepared by aid of the spirit level, the distilled water, at the right temperature, is to be weighed in, or measured in carefully from another accurately graduated vessel, and the level of each quantity marked in ink, with extreme care, on the strip of paper at each side of the vessel. When this is completed, the measure, or bottle, must be brought again to its firm bed—say of sand—and the graduation marked on the glass with the diamond, exactly on a line with the ink mark on the paper. A straight-edge must, of course, be used to guide the diamond, and it will be found a practical convenience to use as a straight-edge something that may be curved round, and plied to the form of the vessel—say a piece of gutta percha, sufficiently thick, and cut with a perfectly true edge.

It aids the eye in the use of the measure, if the larger divisions of the vessel are made with long lines, and the minor divisions with short ones. Thus, in an ounce measure, the half ounce line should be long and well defined—the line at each drachm may be the same length, but lighter and finer—whilst the half drachms should be about half the length. This mode of marking will be familiar to most of our readers; it is shown, however, in the margin.

The diamond must be used with great care and accuracy, without any slips, as each one would be an ugly misguiding scratch on the vessel, difficult or impossible to remove.

The graduation completed, the figures indicating the measurement can be made with the same diamond, on the left-hand side of the perpendicular line. It will be unnecessary to scratch the figures on both sides of the vessel. The whole operation must be conducted carefully and slowly, as any hurry will be likely to cause slips, or other irreparable blunders. Both in making the lines and the figures, it is important to feel that the point of the diamond bites properly before attempting to move it, as going over the same line twice will injure the diamond, and, moreover, result probably in an unsightly blurred-looking scratch, instead of a clear, well-formed line or figure.

We have been referring chiefly to the graduation of vessels of an ounce and upwards in capacity. The same principle would apply in all respects to the graduation of minim measures —a grain in weight representing a minim. Much greater care and accuracy would, however, require to be used, and would involve more time and trouble than would be equivalent to the cost of a carefully graduated one from a trustworthy house.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 9th January, 1860.

M. FAYE, member of the Paris Academy of Sciences, has given us the following remarks on the manner in which photography should be employed during the eclipse of the sun on the 18th of next July:—"In my opinion," says he, "telescopes with large objectives, having about 15 mètres of focal length, should be employed, and a series of proofs taken between the first and last contact, care being taken to fix, by the image of an horizontal wire, the origin of the angles of position, and to observe minutely the time at the moment a proof is taken. . . . . During the totality of the eclipse the objective should be entirely open, and the most sensitive plates should be employed to obtain, on a large scale, images of the solar ring and the flames (or remarkable luminous appendices observed during the eclipse of 1842), whilst astronomers, with less powerful instruments, more easily managed, and whose eyes are properly guaranteed against the too great brilliancy, should study at leisure the only circumstances on which the art of the photographer cannot bear, namely, the colorations of these solar flames and their rapid changes of form."

M. Faye, who will leave Paris to go and observe this grand phenomena in Spain, will employ a photographic instrument to register the precise time which will elapse between the commencement and the end of the total obscurity, so that he may be perfectly free to study the luminous protuberances. The instrument in question is a photographic box, having, instead of a sensibilised plate, a band of photographic paper, which winds off from behind the objective at the rate of 2 centimètres per second. As long as the sun sends forth a ray this ray prints itself upon the paper, but when the last ray of light has disappeared, the photographic impression will cease, and a certain number of mètres of sensitive paper will be wound off white, until a new ray of light again strikes it. To measure the time which elapses during this experiment, a pendulum moves to and fro before the ray of light which falls upon the paper, and intercepts this ray every second; these interruptions will be indicated upon the paper, and will enable the observers to count the hour, minutes, seconds, and fractions of seconds, by the aid of a single compass. The photographic portion of this ingenious apparatus has been constructed by M. Porro; the mechanical time system and pendulum belonging to it have been confided to the experienced hands of M. H. Roberts.

I intend to say a few words here on the *action of light upon oxides of lead.* There exist three oxides of lead, viz., the sub-oxide, Pb_2O, which is grey; it is formed upon the surface of the metal in damp air; oxide of lead, PbO, which is found in commerce as *litharge*, obtained by the calcination of the metal; finally, peroxide of lead, PbO_2, which is of a chocolate colour, and is obtained by the action of nitric acid upon a peculiar combination of protoxide and peroxide of lead, called *minium*, $Pb_3O_4 = PbO_2 + 2PbO$. Now, M. Levol published some time ago in the *Annales de Chimie et de Physique* (xlvii. p. 196), that when *litharge* is exposed to light in damp air, it is oxydised and converted into minium, $3PbO + O = Pb_3O_4$. More recently, the same author published, in the *Journal de Pharmacie et de Chimie* (xxxiv. p. 358), another paper on the same subject, in which the following curious experiment is related:—A *cupel*, which had served for the cupellation of some silver, and which was, consequently, penetrated everywhere by litharge, was half buried in a little heap of powder made by pulverising a similar *cupel*, and the whole abandoned in a damp but light place. After a certain time, the author found that the litharge had undergone oxydation, and had been transformed into minium, throughout the whole mass of the *cupel*, *but only in those parts which were exposed to the light;* in the portion that was buried no change had taken place—the litharge remained as before. This phenomenon is easily recognised, as litharge is yellow, and minium of a red colour. We shall see presently that the observation of M. Levol does not prove that an oxydation had taken place, and that the litharge, PbO, had become *minium*, Pb_3O_4. At all events, the experiment proves *that light is an indispensable agent in this change*, whatever be its true chemical nature; moreover, that the rays of light had penetrated into the mass of the *coupelle*, which we should have thought would have been opaque to them. The *powder* of a similar *coupelle* remained unchanged in its interior, whilst it had been acted upon at its surface, showing that, in this condition, light had not the power of penetrating into its mass. A like phenomenon has been observed with chloride of silver:—Light only acts upon the surface of precipitated chloride of silver, but its action penetrates into the mass of the melted chloride, whose molecules present no solution of continuity.

The reason why I expressed a doubt as to the *oxydation* of the litharge in the above experiment, is that, some time ago, Mitscherlich announced, that the *red portions* observable in commercial litharge are not owing to the presence of minium, as is generally supposed, but *to a dimorphic condition* of oxide of lead. It is, therefore, very probable that in M. Levol's experiment, this *dimorphic modification* is produced by the action of light, but that no oxidation takes place. Besides, minium itself has the peculiar property of becoming black by the prolonged action of light, according to some authors.

In one of my preceding letters I mentioned that much interest had been excited in the astronomical world concerning the supposed existence of a planet, or a series of planetoids, between Mercury and the Sun. M. Leverrier had lately drawn attention to the perturbations of Mercury, and expressed his opinion that a planet remained to be discovered in the above-named region. That opinion had, however, been formulated long ago in the minds of several astronomers, some of whom really believed that they had seen the planet in question. The planet is discovered. At the last meeting of the Academy of Sciences, at Paris, M. Leverrier communicated a letter from M. le Dr. l'Escarbeaut, a medical man, residing in the department of the Seine et Eure, who, having a great taste for astronomy, has organised a small observatory in his dwelling-house, and who has been fortunate enough to discover the planet which really does exist between Mercury and the Sun. But, curious enough, this discovery *was made on the 29th of March last; therefore, some months before M. Leverrier called the attention of the scientific world to the peculiar anomalies in the movement of Mercury.* The observation made by M. l'Escarbeaut, on the 29th of March last, is not complete enough to allow us to expose all the elements of the new planet. Its revolution round the sun is estimated at 19 days, and the planet takes four hours to pass before the solar disc. Its mass appears

to be about the quarter of that of Mercury, and the inclination of its orbit about 12 degrees.

M. Moilin has communicated to the Paris Academy of Sciences a short paper upon the antagonism of arteries and veins. "From certain considerations founded upon the anomatical structure of these vessels, and upon numerous physiological experiments," says the author, "I am compelled to admit an antagonism existing between the arterial and venous systems. The contractions of the arteries play a resisting part—they impede circulation in the organs, whilst their paralysis accelerates this circulation. The contractions of the veins play a contrary part—they accelerate circulation, whilst their paralysis impedes it. The arteries are animated by nerves from the anterior roots; the veins by nerves from the posterior roots of the spinal marrow."

M. Poey writes from Havana, that during the *aurora borealis*, which was visible in northern Europe on the nights of the 1st and 2nd September last, an *aurora Australis* was seen at La Concepcion (Chili), from 12 o'clock at night till two in the morning of the 2nd of September. This coincidence of a *northern* and *southern* polar light being visible at the same time is certainly a singular fact. The southern aurora lighted up the towns of La Concepcion, Santiago, &c., with a brilliant tricolor illumination, blue, red, and yellow. The light was also seen at Valparaiso. The observation of an *aurora Australis* at Chili is of very rare occurrence, and the phenomena caused much alarm among the peasants.

The navigator, Frézier, was the first to mention the existence of southern polar lights; he observed one, which lasted only half a minute, on the 18th May, 1712, at half-past one in the morning. The fact was placed beyond a doubt by Antoine de Ulloa, who observed a southern aurora in 1745.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

APROPOS of these temples, I was astonished at the immense number of people who visited them. No matter on what day we happened to arrive at one of them, we were sure to find a crowd of men and women assembled in and about it; some few prostrate before the idols, but the majority of them gossiping and amusing themselves outside. Many of them must have come very long distances, as their ragged, stained, and muddy dresses testified. Some of these had made the pilgrimage in consequence of a vow, or to obtain the intervention of a god who possessed a speciality for curing a certain complaint; but these formed the smallest portion of the pilgrims—the greater part undertaking the pilgrimage solely because it was a pleasant mode of life—and spent their time in journeying from one temple to another: idle, dissolute vagabonds, who, if they started with peas in their shoes, took care to boil them very soon afterwards. They got their living by begging, and were one of the greatest nuisances to which we were subjected—their quiet pertinacity generally extorting an alms for the purpose of getting rid of them. At first, I was so impressed by their tired and dilapidated appearance, and the belief that they had undergone these hardships for conscience' sake, that I was continually putting my hand in my pocket to relieve them, until Dsetjuma noticed it, and gave me such advice on the subject that I was more discriminating afterwards, and seldom relieved any beggar who was not manifestly incapacitated by age. It is a fact that there are more beggars on the roads in Japan than in any country with which I am acquainted. I have seen a good number in many Italian towns, and I hardly remember stopping for even a few minutes at one of their inns, whether in town or country, without an appeal to my benevolence; and I have likewise lived in Rome—where mendicancy was then not only tolerated, but encouraged—but I never in my journeys met with such a number of professional and other beggars as I have encountered in this country. They travel at their ease, for the most part, journeying only just as far as they feel disposed each day. For food they depend entirely on charity, and, as rice is cheap in most parts of the interior, they seldom fail to get sufficient for their support; for, although it is well known that most of them are the idle rascals I have stated, yet there are among them some who have undertaken the pilgrimage purely from religious motives, but who are compelled to beg their way along, and this little leaven leavens the whole lump to a certain extent; and, from the fear of refusing charity to one of these, people often give to the professional beggar unwittingly. Of all beggars, however, the most pertinacious are those who are members of religious communities—who are a species of mendicants that have some of the customs, besides this especial one, of the mendicant friars still found in Rome, if in no other place. Their number is very considerable, and they are met with everywhere. Their dress has some slight peculiarities which distinguish them from other people, and they wear a string of wooden beads round their necks, or belted round their waists, which they use in connection with their religious observances; moreover, they sometimes shave the head, leaving only a border of hair round the lower part, but this is not imperative on all of them, for I have seen more wearing their hair than shaved. Generally, they march along barefooted, but not unfrequently wear sandals made of plaited rice straw, or finely-split bamboo. From their profession and practice, they appear to me to be a combination of the Roman Catholic priest, the African fetishman, the juggler, and the mesmerist. They sell indulgences to those who desire to enjoy the benefits and privileges of pilgrims without undergoing the fatigues of pilgrimage; they pretend to possess the power of blighting those they look upon, if they choose to exercise it; they have managed to become the possessors of a few of the striking effects produced by chemical combinations, and are therefore regarded by the ignorant people in the interior as exercising supernatural power. I myself saw one of these fellows take a bar of red-hot iron from a fire, and, holding the two ends in his bare hands, bend it double by striking it sharply over his knee, and afterwards remove the burning coals, piece by piece, with his naked hand. They assert they have the power of discovering a thief by drawing figures of ill omen on a piece of paper, burning it, and making the suspected person swallow the ashes in water. If he is guilty, he is said to suffer such pain that he is glad to confess; while, if he is innocent, the draught has no effect. He practises mesmerism to produce insensibility—the patient being submitted to certain passes, precisely in the way in which mesmerists operate in Europe, so far as I can judge from what I have read. They are feared, but are not generally liked by the people, owing to the debauched lives they lead, and the supernatural power they are supposed to possess.

There was another peculiar class of beggars, who, if they did not always ask for alms in plain terms, yet did not leave us in doubt as to what they wanted; these were women, most of whom were young, and many of whom were pretty. We were seldom troubled by these when we traversed bye-roads, but on the frequented highways we were certain to meet with them. They form societies among themselves, but for what reason I cannot tell, unless it be for social intercourse, as they do not have a common purse. Their behaviour to strangers is quiet enough, so far as language is concerned, and they walk along beside him chatting cheerfully and freely without the slightest sign of bashfulness, but their looks and the artful manner in which they disarrange their dress, do not leave him in the least doubt as to their moral character. In fact, they are a kind of Japanese Thamars, who sit by the roadside to decoy travellers into their snares. Their number is always greatest near the temples, for the reason, I suppose, that here the greatest number of travellers are to be found, and that experience has taught them that man is never so prone to evil as when he believes that he has just obtained remission of his sins, and has made a clean slate to start afresh. Whatever may be the reason, how-

* Continued from vol. iii. p. 210.

ever, of their congregating here in the greatest number, they are to be met with in abundance in other parts. We seldom entered or left a town without, at least, one of these coming beside our horses, and, after a humble salutation, beginning a conversation by saying, if it were evening, "May your excellency's rest be refreshing!" or if it were morning, "May your excellency's journey be agreeable to you!" If we did not feel disposed to enter into conversation with them we gave them a trifle, and that was a very effectual way of getting rid of them, for so long as we refrained from giving them anything they kept beside us, although they did not venture to address us a second time; but no sooner did we give them a small coin than they left us to look out for other travellers, whose charity might assume the form which they desired. For my part, as soon as I had acquired a sufficient knowledge of the language to understand it, I took a great deal of pleasure in conversing with some of these women, for I found that they would give me information, not only as to the country through which we were passing, and whatever there was remarkable, but also with respect to the private life of every man of mark in the neighbourhood, the mode of living of the people, and, altogether, a considerable amount of information as to the social habits and customs of their countrymen and countrywomen, which I could have obtained from no other source. It is probably owing to their being so well up in local scandal that the most respectable Japanese thinks it no disgrace to converse with them when he is on his travels, and, for a solitary traveller, especially, it must be very pleasant to have one beside him who is never weary of talking, and who, for a sufficient consideration, will walk half a dozen miles with him. It is a very common practice among innkeepers in towns to have an arrangement with women of this class, who, in the event of bringing a customer, receive a douceur, which varies in amount according to the expenditure of the guest.

(*To be continued.*)

Proceedings of Societies.

French Photographic Society.

M. Van Monkhoven presented a copy of his work on photography to the society; M. Roret presented a copy of his book entitled "New and Complete Manual of Galvanoplasty, or Elements of Electro-metallurgy," an example followed by M. Figuier, who forwarded a pamphlet, being a reprint of his criticisms on the late Paris Photographic Exhibition, which were published in *La Presse*.

M. Gabriel de Rumine presented the society with a series of prints representing divers monuments, views and frescoes taken by him in the course of his journey with the Grand Duke Constantine. M. Dalligny did the same with respect to a portrait enlarged by Jamin's apparatus; and so also did M. Gaillard with sundry other enlarged prints.

M. Davanne produced several positives which were printed from negatives developed by means of a mixture he used when travelling, which enabled him to dispense with acetic acid. This mixture was composed of three parts gallic, one part pyrogallic, and one part citric acids, mixed together in a fine powder. When wanted by the operator for developing, he simply takes a pinch of this powder and dissolves it in water. The prints shown by M. Davanne proved that negatives could be developed in this way as well as if acetic acid were used. The same photographer also read an extract from a letter on the subject of stored-up light. The writer, finding his plates fog, examined his camera and found that light penetrated through several openings; these were mended, but the fogging still continued. He then took the camera into the dark room, and put a sensitised plate in it, putting a second plate beside it, but quite unprotected. The plate in the camera showed signs of luminous action, but that beside it none. The camera having been covered with velvet, the inconvenience ceased. The next fact observed by the same writer was this: a painting, or design, being placed before the lens for a period during which several negatives may be taken, will be reproduced in a confused manner on a plate inserted in the camera, although the lens is kept covered during the whole time the plate remains in it. Suppose, for example, the object which has been copied is a painting, the frame will then be very evident on the plate. M. Davanne thought these two phenomena might be explained from known facts. The manufacturers of cameras had the bad habit of blackening the inside with substances containing gallic acid, and partial reductions have frequently been observed in consequence; besides which, the essential oils in the varnish had a reducing action. He was of opinion that it was to a fact of this kind that the first phenomenon was owing. As to the second, it would be very singular, if it were not to be presumed that the writer had used the same plate several times for reproducing the same object. Now, several photographers had at various times observed that an old image may subsist in a latent state, even in a cleaned plate, and reappear in a subsequent development. The fact had not been explained, but it was nevertheless true.

The President supported the latter statement, and added that the reproduction of anterior images was common enough, especially in the case of daguerreotype plates.

M. Van Monkhoven sent a paper on the subject of Messrs. Llewellyn, Maskelyne, Hardwich, and Hadow's report on the theory of the formation of the photographic image, which will be given in an early number, together with the reply of MM. Davanne and Girard.

The President supported the observations of MM. Davanne and Girard. He did not believe in the existence of sub-chloride of silver, considered as a defined body. Neither this compound nor that of sub-oxide of silver had been prepared in so certain a manner that it could be affirmed to constitute a well-characterised body, and not a mere mixture of chloride of silver and metallic silver. He thought it possible that it might be advantageous to photographers to examine the composition of this pretended sub-oxide of silver.

M. Thompson presented the society with one of Woodward's solar cameras, and gave the following description of it. He described the instrument as supplying a real desideratum, and as being far superior to those constructed with the same object by celebrated Paris opticians. At first sight, one might imagine that they were all alike, but a little examination would show that this was not so, and also the reason why Woodward's succeeded and the others did not. In the Woodward apparatus the reflected light passed through the object glass, while in the others it was dispersed after having strongly illuminated the negative. In the former the lenses are relatively fixed, and it is the negative which is moved to attain the focus, while in the French instruments it is the object glass which is moved in focusing, the negative remaining fixed. The diagrams he exhibited showed that the light was concentrated in Woodward's apparatus and dispersed in the two others before arriving at the object glass, and that, consequently, the French apparatus only possessed the advantage of strongly illuminating the negative, and in other respects accomplished nothing more than any photographer could obtain with an ordinary camera. Woodward's instrument could print a portrait by solar light on chlorided paper in from two minutes to half an hour, according to the size, and also produce a life-size portrait from a negative on a three-quarter plate. M. Thompson received the thanks of the society for his communication.

M. Bayard thought that the great value of Woodward's instrument would consist not so much in printing enlarged positives as in enlarging the negatives themselves, so that they might be used for printing large positives from in the ordinary manner. Great loss of time would by this means be avoided, and better results would in all probability be obtained. He added that he had come to an arrangement with Count Aguado to make some experiments together on this point.

MM. Davanne and Girard presented the continuation of their researches on the subject of paper positives, for which they received the thanks of the society.

M. Lacombe addressed a note to the society on the subject of an apparatus for manipulating the plates in the wet collodion process.

American Photographic Society.

The monthly meeting of this body was held on the evening of the 12th of December, at the Cooper Institute—the president, Prof. Draper, in the chair.

J. D. Davis presented a large photograph of seventy different kind of dahlias.

Prof. Draper remarked that two colours, apparently the same, frequently gave a very different result when photographed.

Mr. Seely suggested that this might be caused by the phosphorescent power, or rather the property of absorbing the chemical rays which was possessed in the one case, and not in the other.

Dr. Langenschwartz, an amateur photographer, who seems to be much interested in experimenting, said that in the pursuit of a means of photographing colours, he had discovered a way in which very beautiful stereoscopic views could be turned off at the rate of five hundred a day—one a minute—and that in a half-dark room; in fact, the sunlight would destroy the picture under his process; his discovery consisted chiefly in regulating the light by means of a box, through which it passed.

A paper was read by P. C. Duchochois on a new dry collodion process.

The Secretary, Mr. Deck, recommended an article of vegetable parchment as a superior one for photographic purposes.

Prof. Joy, of Columbia College, presented a new kind of mirror, which he had brought back from Germany last summer, an invention of Baron Liebig, and claimed to be a perfect mirror, promising, on account of its cheapness, to come into general use. The mirror consisted of a deposit of silver upon glass by a process which is yet a secret, the glass being afterwards backed by a deposit of copper. By means of this process all such articles as caoutchouc and gutta percha ware might be plated with silver and gold.

Miscellaneous.

Discovery of a New Planet between Mercury and the Sun.—As we have referred to a photographic method by means of which the existence of a planet between Mercury and the Sun might be ascertained, our readers may, perhaps, be glad to learn that the discovery that such planet does exist has been made by Dr. l'Escarbeaut, of Orgères, a small town in France. The existence of this planet was assumed by M. Leverrier, the distinguished chief of the Imperial Observatory at Paris, from the perturbations in the movement of Mercury, and his calculations have been verified by the observations of the amateur astronomer whose name we have given above. From the flood of light in which the planet revolves, it is difficult to ascertain anything very precise with respect to its dimensions and so forth; but there is little doubt—the fact of its existence being established—that our able astronomers at the Royal Observatory and elsewhere will, before long, give us some better account of it than that which we at present possess.

Photographic Notes and Queries.

Has the Vapour from Pine any Detrimental Effect on the Nitrate Bath?

Sir,—I am happy to find my query has elicited a reply from "Oxoniensis," and have great pleasure in giving him the particulars he desires. The nitrate bath in question was prepared from crystallised (not fused) nitrate of silver, thirty grains to the ounce of distilled water, saturated with iodide of silver, carefully filtered, and finally, slightly acidified with glacial acetic acid; forty-eight ounces were made at the time, the chemicals being of known purity, and the water distilled under my own supervision, and tested to ascertain its freedom from all contamination. The glass bath also was chemically clean. I therefore assumed the bath was *normal* in every respect, and its performance for some weeks proved the accuracy of the assumption. The collodion used was procured early in the spring from a leading London firm, and has always afforded such uniform good results, that I invariably employ it. I have generally obtained a pint at a time uniodised, and find its qualities improve by keeping, viz., within certain limits. No alkali had been added to the bath, nor had any organic matter been introduced into it accidentally or otherwise. Therefore, judge my surprise at finding my bath gradually losing strength by the spontaneous process of reduction which had so mysteriously commenced. The only solution of the problem appeared to be that it might possibly result from the action of the vapour emanating from the pine-wood envelope of the bath. Now, as we know all the hydro-carbons are powerful reducing agents, I conjectured that the pine vapour *might* act by reducing the silver solution on its surface, which was always subject to its influence, and once commenced, by a kind of catalytic action, the reduction of the silver slowly but progressively continues, a very thin but universal black deposit (oxide of silver) taking place on the sides of the bath and dipper. Being by no means confident that this theory would explain this singular change in the bath, I inserted my question in your excellent journal, hoping to obtain information on the subject. That the vapour from pine has a deleterious effect, I think the following experiment will prove. Let any one clean most scrupulously, by any of the most approved methods, some glass plates; let half of them be placed at once in either a tin or mahogany plate box, and, if kept in a warm, dry room, they will remain clean for a considerable period. Put the other half in a pine or deal box, and upon inspection, in a few days, especially if the weather be hot, the plates will be found sullied and incapable of yielding clean negatives. If collodio-albumen or Fothergill plates be subjected to the same treatment, those contained in the pine boxes will inevitably afford foggy pictures. I must submit, with all due deference to "Oxoniensis," that using a nitrate bath *occasionally* in a tent constructed partially of pine, and keeping one *constantly* for weeks together during very sultry weather in a box of the same material, are not analogous cases, and perfectly as I agree with him as to the value and excellence of the fixing process of "*0*" (and having practised all, can fairly say a better does not exist), I must dissent from him *in toto* as to the *inertness* of gutta percha in argentine solutions. When I first commenced the practice of photography, shortly after the discovery of the collodion process, porcelain baths and dishes were generally used for silver solutions; these did not answer very satisfactorily, and were shortly after superseded by gutta percha, and gutta percha in its turn has yielded (and I think deservedly so) to its more costly but more cleanly rival, glass. I think most photographers will bear me out in the assertion that gutta-percha baths and bottles, as procured even from the best manufacturers, will, unless previously coated with shellac varnish, gradually deteriorate and damage silver solutions, *if* contained in them for any length of time. This I take to be the rule, the reverse the exception. If the gutta-percha bath be only used as an occasional receptacle of the silver solution whilst operating—the solution being returned immediately after use into a stock bottle—I grant the gutta percha may exert a very trifling, nay imperceptible, influence on it. Now I am rejoiced to say good cast-glass baths and dishes can be obtained at a reasonable price, and I think every photographer who has any regard for his nitrate bath, (and who has not?) will discard gutta percha and adopt that pure and innocuous material, glass. H. R. R.

Micro-Photography.

Sir,—To those of your readers who possess a microscope, the following method of producing minute photographs for that instrument, without the employment of any extra apparatus, will, probably, be of sufficient interest to merit a place in your columns.

The mirror and eye-piece of the microscope must be removed, and, in place of the latter, a hollow cylinder of black paper inserted in the tube to prevent reflection from the polished interior surface.

The instrument is then to be placed on a firm shelf, attached to an exterior partition of the dark room, and the body inclined to a horizontal position. A circular hole must

be made in the partition sufficiently large to receive the compound body, and just so high above the shelf that, when it is inserted, the horizontal position may be still preserved. A piece of black velvet or cloth wrapped round the body will preserve it from being scratched, and prevent the ingress of white light between it and the sides of the hole.

Outside the dark house, at a distance of two or three feet from the hole, and opposite to it, the negative is placed, and close behind it a common looking-glass, at a proper angle to reflect the direct light of the sky through the negative and tube of the microscope.

Next select a number of glass slips, 3in by 1in., *of the same thickness*, and grind the surface of one of them with fine emery; place this on the stage and use as a focusing screen. Having focused the picture, allowance must be made for the difference between the optical and the chemical foci. To effect this, slightly *increase* the distance between the object glass and ground glass by means of a fine adjustment screw. All is now ready for taking the picture, which is done as follows:—Place a piece of cardboard between the object glass and stage in such a way as to cut off the image; then remove the ground slip from the stage and substitute one of the others, having a drop of collodion, sensitised in the usual way, in the centre. Expose by removing the cardboard, which replace when the exposure is completed; develop with pyrogallic developer, and fix with hypo. In order to ascertain if the focusing has been correctly performed, the picture must be examined by another microscope or magnifier without disturbing the original arrangement, and, if found imperfect, another picture taken with a slight alteration of the fine adjustment. Having once hit the correct focus, any number of pictures can be taken without any further trouble, provided slips of a corresponding thickness are employed. The only difficulty I have found in the whole process consists in focusing; but this may be much diminished by placing a stop, with an aperture about the size of a pin's head, between the combinations of the objective. This increases the sharpness of the picture, and gives depth of focus; but, of course, requires longer exposure. I have found, with such a stop, and an inch object glass, about two minutes the average time.

As I am no friend to the employment of expensive apparatus, when the same can be accomplished by simpler means, and as many of your readers are, doubtless, of the same opinion, I trust I need make no further apology for troubling you with this communication. W. W. BURNAND.

P.S.—The production of good micro-photographs appears very much to depend on the employment of a suitable collodion. Perhaps some of your numerous friends can inform me where such may be obtained.

Poole.

CUTTING GLASS.

SIR,—In treating of glass, I may give you another way of cutting bottles, shades, or any glass vessel the neat thing you wish, and that is to get a rod of iron heated to redness, and having filled your vessel the exact height you wish it to be cut over by with *oil* of any kind, you proceed to very gradually dip the red hot iron into the oil, which heating all along the surface, suddenly the glass chips and cracks right round, when you can lift off the upper portion clean by the surface of the oil. This never fails, and many a couple of serviceable bell glasses have I made in this way from a six-pound confection bottle.

If the above is suitable, it is at the service of your readers, and forms only an instalment of useful hints which one photographer could give to another through your medium. ALEX. TAYLOR.

THE GELATINE PRESERVATIVE PROCESS.

SIR,—In the last number of your paper a correspondent, "H.M." seems to doubt the capabilities of the gelatine preservative process. A short time ago, the Rev. C. P. Cleaver published the results of his practice of it, and failures with him seem to have been very rare. He kindly sent me a few pictures for inspection, and all (but especially a stereo. view of Rivaulx Abbey, Yorkshire) are as fine specimens as ever I saw produced by any process, wet or dry, not excepting the beautiful prize pictures by Woodward, obtained by the Taupenôt process.

Mr. Cleaver, however, seems to consider the condition of the collodion used a matter of primary importance; and I think that it is this circumstance only that makes the process at all inferior to the collodio-albumen. But is not this disadvantage more than counterbalanced by the ease of manipulation, and lengthened keeping qualities?

Pembroke College, Cambridge. D. H.

THE FOTHERGILL PROCESS.

SIR,—You must be nearly tired of the Wet *versus* Dry controversy, but there is one point regarding the Fothergill process that I have never heard mentioned, which is, that dry plates are always chalky and hard, from the quantity of development required to gain intensity; but if the plates are merely developed till all the detail is out, then washed, and the sky painted out, I believe few could tell whether the resulting positive was from a wet or dry negative. HALF-PAY MAJOR.

TO CORRESPONDENTS.

J. B. H.—1. About three inches square. The difference of rapidity between the single and double lens would all depend upon the amounts of light which came through them. If the lenses were of the same foci the rapidity would vary directly as their areas. 2. A half-plate portrait lens. 3. We have, on several occasions, given information such as you ask for. Consult our previous numbers.

Y. Z.—If the acetic acid is *glacial* it cannot be further concentrated. If it is dilute acid it should be saturated with carbonate of soda, evaporated to dryness, and then distilled with oil of vitriol. The glacial acetic acid can however, be purchased far cheaper, and of greater purity, than you can make it on the small scale.

E. A. H.—1. The present volume commenced with No. 53, and will extend over twenty-six weeks from that number. 2. The Almanac will be forwarded on receipt of 1s. 1d. in stamps. 3. No instrument or other means for the purpose is known; it is, at the best, a matter of chance. Experience will help you a little. 4. No such register is published.

H. FRASER.—If the reservoir were a sufficient distance from the burners to avoid heating there would be no danger that we can at present see. The lamp must, of course, be carefully constructed. Tin burners would not be advisable to be used, as they would get too hot. Earthenware ones are to be met with.

J. B.—We do not think the camera named would be superior to many contrivances for effecting the same object, which have been in use for several years past in England. The pictures which we have seen taken by it are not at all good.

A. R. P.—We have known many instances in which alabastrine photographs have turned colour. We cannot, therefore, consider them as uniformly permanent. The number containing the formula is to be obtained on application to any news agent.

G. R. B.—1. The use of alcohol in the developing solution is recommended on account of its causing the liquid to flow freely over the plate. Add it in sufficient quantity to overcome the greasy appearance. 2. A few drops of acetic acid.

R. H. D.—There is an accumulation of alcohol and ether in the bath, which occasions the greasiness and marks complained of. Boil the bath violently for ten minutes in a glass vessel, with a few grains of cadmium; filter, and add a drop or two of acetic acid, to acid reaction.

F. B. E.—1. Evaporate to dryness with excess of nitric acid, fuse at a gentle heat, dissolve in water, and crystallise. 2. No objection, except after very dry weather.

F. S. (Bury St. Edmunds).—The figures describing the dimensions of the paper referred to, should have been 23 × 18 inches, instead of 28 × 18, which was a misprint.

X. Y. Z.—We will endeavour shortly to so arrange that our correspondent's suggestions shall be carried out. Meantime, we are much obliged by the friendly letter.

ALEX. WATT.—The numbers have been sent to the address named, and returned "not known."

T. MARTEN.—Your letter shall receive attention. We shall be pleased to be favoured with an account of your process.

D. H.—We do not know where long-focused stereoscopes are to be met with None are made, to our knowledge.

G. M.—The specimens of albumenised English paper have arrived, and seem very satisfactory. No specimen print, however, accompanied them.

L. H.—It is a doubtful point; we cannot advise.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—Pretty Mess.—P. O. R.—F. L.

IN TYPE:—Jex.—R. L.—Oxoniensis.—A. Taylor.—J. F. Hardwich, Esq.—E. T. O.—M. Van Monkhoven.

***** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."**

THE PHOTOGRAPHIC NEWS.

VOL. III., No. 72.—*January* 20, 1860.

ON THE THEORY OF THE FORMATION OF THE PHOTOGRAPHIC IMAGE.

BY M. VAN MONKHOVEN.

MESSRS. MASKELYNE, LLEWELLYN, HARDWICH, AND HADOW, in a report made by them to the London Photographic Society, state that the action of light on the chloride of silver consists in the elimination of an atom of chlorine and an atom of chloride of silver, corresponding to the formula of the sub-oxide of the same metal. So that we shall have $2\,(Ag\,Cl) = Cl + Ag_2\,Cl$. On the other hand, Messrs. Davanne and Girard have shown that by a sufficiently prolonged exposure to the light, merely chlorine and silver are formed—$(Ag\,Cl)_2 = 2\,Ag + 2\,Cl$. In the October number of the *Bulletin*, which I have just received, the translator seems to find a complete contradiction between the results obtained by the English commission and those of Messrs. Davanne and Girard. As this contradiction is only apparent, I take the liberty of stating how I regard this phenomenon, and supporting my opinion by precise experiments.

If we cause a ray of white light to act on a sheet of paper sensitised with *pure* nitrate of silver, this chloride changes colour rapidly, and acquires a violet tint identical with the greater part of the known sub-salts of silver. If the action be prolonged for *several hours*, the whole of the film assumes a deep violet tint, due to the complete conversion of the white chloride into a sub-chloride. Indeed, if we submit a paper thus coloured to the action of a very strongly concentrated solar spectrum, preserved unmoved by means of a heliostat, at the end of about a quarter of an hour we shall discern that the sub-chloride assumes a red colour in the red of the spectrum, and that the blue and the indigo leave evident traces of blue and indigo (Herschel). Greater success is obtained with a thick than with a thin film. I will endeavour to develop this property of the sub-chloride more effectually.

To prepare this substance powdered silver may be shaken up with bi-chloride of copper, but we have never been able to obtain in this way a compound which was found to be identical when submitted to analysis; it is better, therefore, to prepare it as follows:—

In a long and large tube, surrounded with boiling water, put citrate of silver obtained by the double decomposition between the nitrate of silver and the citrate of ammonia. This citrate of silver is submitted for three or four hours to a current of hydrogen, care being taken to turn the tube from time to time, in order to facilitate the reduction. The citrate of silver passes rapidly from white to deep violet. When it has reached this point the product must be dissolved in lukewarm water and precipitated, after filtration, by potash. A black *sub-oxide* of silver is thus obtained. This body submitted to a current of pure hydrochloric gas is converted into *sub-chloride*. This violet powder is left for several days exposed to the air, in darkness, to deprive it of the hydrochloric acid.

This body is destroyed by hot nitric acid, but not by cold nitric acid diluted with its volume of water. Now, if it were a mixture of metallic silver and ordinary chloride, the nitric acid would immediately dissolve the silver and bleach the substance.

If this sub-chloride of silver be exposed to the solar spectrum it will colour red in the red, and blue in the blue. If the substance had been previously heated to 212° F., it reproduces the whole spectrum, but the yellow and orange are scarcely apparent.

It will be seen, therefore, that the action of light on the paper really does produce a sub-chloride, as the London committee state; but, nevertheless, let us see what a prolonged exposure to the light gives us. Before we do this, however, let me state that all bodies which dissolve the white chloride of silver destroy the violet sub-chloride; thus with the hyposulphite we have

$$\underbrace{Ag_2\,Cl}_{\text{Sub-chloride of Silver.}} + \underbrace{Na\,O,\,S_2\,O_2}_{\text{Hyposulphite of Soda.}} = \underbrace{Ag}_{\text{Silver.}} + \underbrace{Na\,Cl}_{\text{Chloride of Sodium.}} + \underbrace{Ag\,O,\,S_2\,O_2}_{\text{Hyposulphite of Silver.}}$$

And, in fact, if we submit insolated chloride of silver paper to the hyposulphite, the tint changes instantaneously, and the paper no longer yields coloured impressions to the solar spectrum.

Let us now see what Messrs. Davanne and Girard say. It is, that if paper containing chloride of silver be submitted to the action of the sun for a sufficient time, a moment arrives when all the chlorine is eliminated, and there remains ultimately nothing but metallic silver. This is true, but very difficult to verify with ordinary chloride of silver. Here are two experiments by which we shall establish that Messrs. Davanne and Girard's assertion is rigorously exact.

We precipitate a film of metallic silver on a glass plate by means of ammoniacal oxide of silver and tartaric acid. The precipitated silver is brilliant and coherent, and, when the film is dry, can be polished with a bit of cotton-wool. We have thus an infinitely thin layer of silver, which is perfectly isolated, since the glass is unassailable. This layer is submitted to the action of humid chlorine during a quarter of an hour, or even longer. It is necessary that all the silver should have given place to a white layer of chloride of silver. Here, again, is a pure substance, and there will be no organic bodies present to disturb the phenomenon. We expose this chloride of silver to the solar light for three hours pretty nearly, which will depend on the intensity of the light; but it will be seen that the action is sufficient if the side of the film of chloride which has not been exposed to the action of the direct rays of the sun is of a deep violet tint. The action is then stopped.

We have mentioned three hours as being necessary to accomplish this—that being the mean of our experiments. This film is of a very deep violet colour, very much deeper than a positive on removal from a printing frame. Now what is this violet substance? Let us see.

Immersed in a mixture of nitric acid and water, the colour is not modified, provided the precaution has been taken to let the glass cool first. Now, if this violet body was formed of metallic silver it would dissolve; if of a mixture of silver and chloride, it would whiten. Immersed in hyposulphite of soda, cyanide of potassium, ammonia, or ethyl-ammonius, the film changes colour instantaneously, and assumes the grey tint of metallic silver. Besides, the grey film is then removed by nitric acid, which dissolves it. This effect is easily susceptible of explanation, if we consider that the bodies which dissolve white chloride of silver decompose the black chloride.

Finally, if we submit the film, such as we obtain it after insolation, to the action of prismatic colours, we get an image of the spectrum. Whence arises this coloration? We will endeavour to answer this question presently.

We see, then, that all these experiments agree, and the light, in acting on the chloride, causes it to undergo a conversion into sub-chloride. But if, instead of leaving the glass for three hours in the sunshine, we submit it to a light concentrated by lenses or mirrors, or otherwise leave it exposed to the sun for several days, it will assume a grey tint, and the film will be completely soluble in cold diluted nitric acid.

Therefore, the light in acting on the chloride of silver first converts this into a sub-chloride sensible to the coloured rays of the prism, then into metallic silver.

I do not think that any author has more rigorously established these experiments. Is this violet body sub-chloride of silver? Is it a mixture of silver and white chloride—a mixture which would present a peculiar physical condition? I shall return very shortly to this question; but M. Becquerel has already proved it, in the production of colours on black chloride of silver—there is very probably chemical action, since there is a production of electricity.

This experiment may be imitated with a collodion composed of ether, alcohol, pyroxyline, and a soluble chloride. The only one which can be used is chloride of lithium; but not having any at hand, I took chloride of ethylamine, or, as M. Regnault terms it, ethyl-ammonia.*

The glass was coated with collodion, and sensitised as usual; then the film was washed and exposed to the sun until it reached the violet. It yielded the same results, but the colours of the spectrum came badly. After several hours (if the film is thin, less time is required), it has acquired the tint of metallic silver.

From all this it results that the report of Messrs. Maskelyne, Llewellyn, Hardwich, and Hadow is correct, because, in fact, they only examined the action on ordinary papers, and within ordinary limits. When they say the *ultimate action*, the words must not be construed too strictly; while in the case of Messrs. Davanne and Girard, they have pushed their experiments to the extreme. In fact, in photography we never push the exposure to the sun to its extreme limits. What takes place in a chlorided paper with excess of salt of silver? Why, in proportion as there is formation of sub-chloride, there is a formation of chlorine; that this chlorine decomposes nitrate of silver to form anew white chloride of silver, which in its turn is decomposed. It would be necessary, therefore, that all the silver of the nitrate should be removed before it would be reduced to the metallic state. This never takes place.

We shall here terminate this letter, which is already a great deal too long; but the profound esteem we have for Messrs. Davanne and Girard, the names of Maskelyne, Hardwich, Hadow, and Llewellyn, so well known among photographers, have induced us to relate a small portion of the experiments we have made on the action of light on the salts of silver and heliochromy. We shall shortly return to the subject—as soon, in fact, as our experiments are completely terminated.

[In reply to the above paper of M. Van Monkhoven Messrs. Davanne and Girard state as follows:]—

It is with pleasure that we have received M. Van Monkhoven's letter, and that we see discussions established on photographic theories. These discussions, leading to new researches, can only improve the practical results.

If we differ in opinion with the English experimentalists, we are almost in accord with M. Monkhoven. He admits, in fact, like us, that the final result of the luminous action is the decomposition of the chloride of silver into chlorine and metallic silver; only, while, in our opinion, this decomposition advances with rapidity, and the sub-chloride of silver, if it exists (which we do not yet believe), would only be in a transitory condition, M. Monkhoven thinks that this sub-salt presents sufficient stability to constitute a print.

* Almost all the chlorides are insoluble in collodion, or modify it by very rapidly altering the pyroxyline. Chloride of cadmium, which is slightly soluble, is precipitated after a few days.—[Chloride of strontium will answer perfectly well.—Ed.]

We will state, in the first place, that in Belgium and in England, as in France, we are all agreed on the composition of the finished proof. After a proper fixing there is no longer sub-chloride, and the image is made by metallic silver free and combined with organic matter. This fact was demonstrated by our experiments made and published four years ago.

While now admitting that the finished proof does not contain sub-chloride, the English experimentalists say: the action of the light has formed sub-chloride of silver, but the fixing has decomposed it into metallic silver; the question, it will be seen, becomes, therefore, purely scientific. According to them, the chloride of silver is not completely reduced until after the fixing; according to us, it is so on removal from the printing frame.

We hastily group the facts in support of the first opinion, and we will present the reasons which induce us to persist in that which we had previously announced.

We regret that it is not in our power to discuss the arguments of Messrs. Hardwich, Hadow, Llewellyn, and Maskelyne, but they have not published their experiments; we can only, therefore, reply to the proofs brought forward by M. Van Monkhoven.

The proofs are of two kinds: some taken in the physical order, the others in the chemical reactions.

Physical Proofs.—When we prepare black sub-oxide of silver by means of citrate of soda reduced by hydrogen and treat it with hydrochloric gas, we obtain, it is said, a sub-chloride of silver, and this body reproduces the colours of the spectrum.

If we prepare a very thin layer of chloride of silver, and expose it to the light a sufficient time for it to become violet, and afterwards expose it to the action of the solar spectrum, a reproduction of colours takes place also.

Evidently there is every reason to believe from these experiments that these two bodies are identical; but does it follow on that account that they are sub-chlorides? and the substance prepared in the manner indicated by M. Van Monkhoven, brought to a state of purity, can it free itself from all its hydrochloric acid, and does it yield the elements of the sub-chloride of silver $Ag_2\,Cl$?

This proof drawn from the physical condition appears to us to be in no way conclusive; for if we admit a mere molecular change in the violet substance obtained, that does not prove that this violet substance is a sub-chloride of silver. If it be pretended that it is not a mere molecular change, but really a chemical decomposition, it must be admitted:—1st, that the rays of the spectrum have more influence than white light, since they conclude a decomposition which three hours' exposure to white light had not been able to bring about; 2ndly, that the decomposition is more or less profound, and that sub-chlorides exist of every degree of basicity.

Chemical Proofs.—If we still retained any doubts after this consideration of the physical condition, they would be quite removed by the chemical evidence.

From the chemical point of view, we could examine the fact under two different conditions: either the experiments might rest solely on the chloride of silver, but then we shall not be in a position to obtain a good proof; or we will place ourselves in the position to obtain a good photographic print, that is to say, we will have in the presence of the chloride of silver, nitrate of silver and organic matter.

Let us examine, in the first place, what passes in the presence of chloride of silver alone.

A thin film of chloride of silver was precipitated on a glass, left in the light for three days, then collected and analysed. Treated with cold nitric acid, this matter yields nitrous vapours, there is an attack on metallic silver, the residue is sensibly white chloride of silver; *therefore the action of the light has not been pushed to its extreme limits.* Ammonia then added, dissolves the entirety, and leaves only inappreciable traces, which are incapable of soiling the filtering paper; there was then only a trace of sub-chloride of silver, if there were any at all, for this sub-chloride

should have resisted the action of the nitric acid, been decomposed by the ammonia, and left on the filter an appreciable quantity of matter, capable, in a word, of forming a print. Therefore, when the chloride of silver is alone, we do not find sub-chloride. When the chloride of silver is mingled with the substances necessary to give a good photograph, the absence of the sub-chloride is, perhaps, still more evident.

In respect to this, we have observed—The proof is formed partly by the decomposition of the chloride of silver, partly by the combination of the silver with organic matter. This latter combination is especially important, for with chloride alone we cannot get a proof, while with only albumen and nitrate of silver, without any chloride, we can get a good print, *which certainly nobody can say is formed of sub-chloride of silver.*

Having prepared two ordinary photographic proofs, the one on salted paper, the other on albumenised paper, we placed them beside a negative proof on glass, developed with sulphate of iron, and, consequently, formed of pure silver; we then tried on all three in succession the action of pure cold nitric acid, of ordinary concentrations, and nitric acid diluted with its volume of water.

When we use concentrated acid the image disappears in a few seconds, the negative proof first, the positive on salted paper next, and that on albumenised paper a little later.

With nitric acid diluted with water all three proofs endured much longer—*then all three disappeared in the same order*, but at a much more considerable interval, especially as regards the albumenised proof; the altered parts retained a faint pearly tint, whether with pure acid or with that diluted with water, which tint may be due either to the immediate action of the light, or, perhaps, to the presence of a trace of sub-chloride in a transitory condition.

These experiments we repeated in the presence of M. Bayard; they seem to us sufficient to prove that there is no sub-chloride in the proof, or that, if this sub-chloride exists, it is, contrary to the assertions emitted hitherto, alterable, like silver, as well with concentrated as with diluted nitric acid; and, in that case, we avow that we have not the means of verifying its presence. As to the retardment introduced in the action of diluted nitric acid, it is explained by the presence of organico-silver combination less alterable than the silver itself; and the difference between the time required to destroy a print on merely salted paper, and a print on albumenised paper, is sufficient to prove this.

According to these experiments and arguments, we do not think that the proof on removal from the printing frame is formed of sub-chloride of silver. The sub-chloride of silver may exist, but then it is equally decomposable by light, and is only on the print in a transitory condition, and we believe we are in a position to assert that the image is formed:

First. By silver resulting from the decomposition of the chloride of silver—silver which is assailable more or less rapidly by cold diluted nitric acid.

Second. By a combination of silver and organic matter less easily assailable than silver itself.

THE POSITIVE COLLODION PROCESS, WITH SOME REMARKS ON THE ALABASTRINE PROCESS.*

BY G. WHARTON SIMPSON.

It is a somewhat singular fact, that whilst the positive collodion process is regarded as the simplest and most easily managed of all photographic processes, there are found amongst exhibited collodion positives a greater number of thoroughly bad pictures—productions at once a disgrace to photography, and a burlesque upon art—than are produced by any other process. Perhaps, indeed, the very simplicity of the process, the ease with which *something* having a relation, however remote, to pictorial art, may be produced, is really the cause of this prolific spread of such photographic enormities. Certain it is that there are no mysteries in the process, no difficulties in the manipulation, to hinder persons of average capacity and ordinary care and perseverance from producing, under anything like fair circumstances, excellent photographic, if not always artistic, results.

In the details I am about to give of my own practice, I shall, at the risk of producing something very like an elementary treatise on the subject, begin at the beginning, and very briefly describe the manipulations in their natural order.

SELECTING AND CLEANING THE GLASSES.

The glass I prefer for the purpose is the best flatted crown, picked free from blemishes and scratches. The smoothest side should, of course, be chosen for the picture; and if, as is sometimes the case in large plates, there be a slight curvature, I coat the plate on the concave side. In regard to methods of cleansing, it is possible to obtain a perfectly clean plate—the thing imperatively required—by almost any of the plans recommended by various operators. The most certain and speedy method I know is by the use of a preparation sold for the purpose under the name of the "Photographer's Detergent." This is a liquid about the thickness of cream, which is applied to the plate with a piece of woollen rag, and which begins to dry almost immediately it is applied. It is removed by rubbing the plate with a clean linen cloth, all dirt and grease disappearing at the same time. A solution of somewhat similar character, perhaps not quite so good, is made as follows:—

Water	1 ounce.
Alcohol	1 „
Nitric acid	1 drachm.
Fine Tripoli, *quantum suff.*	

The solution should be of the consistency of thick cream. A good method of applying it is with a rubber, made of a strip of list or woollen cloth, a foot or two long, and three inches broad, rolled up tightly, and tied with string. The advantage of this method of cleaning, either using the preparation just described, or the "Photographer's Detergent," is that no water is required, and thus a considerable amount of time and trouble are saved; whilst the use of an alkali, always dangerous and of doubtful efficacy, is avoided. The cloths I prefer for the purpose are those of a strong coarse linen, known among housekeepers as glass cloths. Partially-worn diaper, which has been often recommended on account of its softness, is objectionable, as causing a large amount of "flue," the particles of which cling about the glasses. The cloths should be frequently washed in boiling water, without the use of soap. The wash-leather, for giving the final polish, I generally treat, when new, in the way I formerly practised for cleansing the buckskin used for covering the buffs for polishing daguerreotype plates; namely, after beating them well, I wash them well in a mixture of equal parts of spirits of wine and water. In using the leather, I adopt the precaution of keeping one side—the rough side—always to come next the hand; and the other—the smooth side—always next the glass. By this means any chance of perspiration from the hand coming in contact with the glass is avoided. In some states of the atmosphere, and with some qualities of glass, every possible precaution is required to get a clean plate. If the plate cannot be got to appear satisfactorily clean, on breathing on it, it is best to throw it aside; as a good positive cannot be produced on an imperfectly cleaned plate.

THE COLLODION.

A variety of collodions essentially differing in characteristics have been prepared for the positive process by manufacturers, and a variety of opinions have been expressed as to the requisite qualities of a positive collodion—many recommending a thin, lightly-iodised collodion, and a weak nitrate bath; others enforcing the importance of a highly-iodised collodion of good body, and a strong nitrate bath; some recommending the use of bromides and chlorides, and some

* Read at the North London Photographic Association, Nov. 30, 1859.

preferring the simple iodide. Perhaps the diversity of opinion arises to some extent from different ideas being held as to what constitutes a good positive. Some authorities, of high repute, speak of the necessity of a very thin white deposit of silver, pure in colour, but without intensity. My own experience is decidedly opposed to this idea; such pictures, especially if backed with black varnish, generally appear comparatively poor and flat, deficient in vigour and perfectness of modelling. A collodion giving a rich creamy film in the nitrate bath, yielding on development a fair amount of intensity, combined with pure colour, gives by far the boldest and most vigorous picture.

I have tried several methods of making soluble cotton for a positive collodion. The last formula given by Mr. Hardwich, in which a large excess of sulphuric acid is used, for the ostensible purpose of parchmentising the cotton prior to its conversion into pyroxyline, I have found to give an excellent cotton when it gives any at all; but on comparing my own experience with that of several friends who have tried the same formula, I find that a large per centage of failures has been the result. This has arisen, doubtless, from some slight unobserved or unknown error in proportions or manipulations; but the great danger exists, of which Mr. Hardwich himself speaks, of the whole of the cotton being entirely dissolved by the acids. The formula I have found to give uniform success, both in my own hands and that of others, is one, an approximation to which is, I believe, commonly used, but which I find given definitely by Mr. Sutton. It is as follows:—Of sulphuric acid s.g. 1·840—the oil of vitriol of commerce is, I believe, sufficiently near the mark—and of nitric acid s.g. 1·420, equal parts by measure. To three measured ounces of the mixed acids, one drachm of cotton wool will be about the right quantity. The time of immersion not less than five minutes; the temperature being maintained at about 150°. I have found that the nitric acid most commonly sold, commercially, as pure nitric acid, has generally a s.g. of 1·360; and in this case I have found that six measured parts of sulphuric acid to four of nitric acid of this strength give an excellent soluble cotton. In either case the cotton gains fully fifty per cent. in weight, and yields an even sensitive film, adhering well to the glass, and quite transparent in the shadows.

Six grains of either of these cottons will dissolve perfectly, with scarcely a perceptible residue, in equal parts of washed ether s.g. 750 and alcohol s.g. 820. More cotton would dissolve, but this is sufficient. Alcohol and ether of these strengths are easily procurable; and I have found after long use that the alcohol may be used, safely and with advantage, in at least equal proportions with the ether.

I may here state an interesting experiment I recently made with reference to the principle of alcoholic collodion, as proposed by Mr. Sutton, of Jersey. In order carefully to test the principle, we prepared in Mr. Sutton's laboratory three samples of collodion. The first sample contained four parts of absolute alcohol to one of absolute ether, and constituted what Mr. Sutton has called alcoholic collodion. The second contained equal parts of the same solvents. The third sample contained seven parts of the ether to one of the alcohol. The s.g. of the ether was 723, that of the alcohol 799, and both were methylated. Each sample contained eight grains of cotton to the ounce, which dissolved perfectly. Each was iodised with iodide of potassium, fourteen grains of which were dissolved in one ounce of alcohol s.g. 820, of which solution one part was added to three of plain collodion. On adding the iodiser, in each case entirely different results were produced as to colour; the alcoholic collodion took a pale straw or lemon colour, which it has preserved to this day—between two and three months—without getting deeper. The second, or half-and-half, rapidly took a pale sherry colour; and the third, or ethereal, became red within an hour. I may add, to explain the rapidity of these changes, that the cotton was slightly acid from hasty and imperfect washing. I brought these three samples to London, and tried them carefully against each other about a fortnight after they were made. The results were interesting and instructive. The first, or alcoholic, which flowed over the plate like oil, without the slightest trace of structure, required ten seconds' exposure in a somewhat dull light to obtain a good picture; the second required fifteen seconds to produce similar results; and the third, twenty-five seconds. In each case good fine-toned positives were obtained. In this case the effect of alcohol in increasing the sensitiveness of the collodion was strikingly illustrated, whilst the respective changes of colour were very significant as to the chances of stability in each sample.

A continuation of this experiment was interesting, and confirmatory of all my experience as to the effect of bromides. I divided each of these samples, and to half of each added a bromide in the proportion of from half a grain to a grain to each ounce, the first result of which was a slight milkiness and subsequent precipitation of, I presume, bromide of potassium. On subsidence I tried each bromidised half against that simply iodised. The alcoholic sample, requiring, when simply iodised, ten seconds' exposure, required only three seconds with the addition of a bromide. A similar or still more marked increase of sensitiveness occurred in the other samples. The silver bath was an old one, to which no addition of nitric acid had ever been made. The developer, protosulphate of iron, acidified with acetic acid. These facts seem to controvert the idea frequently expressed, that bromine is an accelerator only in the strict absence of organic matter, and where nitric acid is used in the bath and developer.

To return to my own practice in the positive process. The collodion I generally use stands thus:—

Washed ether, pure or methylated, s.g. from 720 to 750	1 ounce.
Alcohol s.g. 820	1 ,,
Iodide of cadmium	3 grains.
,, ammonium	5 ,,
Bromide	1 ,,
Soluble cotton	10 or 12 ,,

I use these proportions with spirit of the strength named, which is generally easily procurable. Where absolute alcohol can be procured, a much larger proportion of alcohol can, as I have already said, be used with advantage.

This collodion gives a creamy film in the bath, and under ordinary circumstances yields a picture possessing vigorous lights, with delicate half-tones graduating into rich transparent shadows.

I find, however, as I think every photographer has found, that no formula will work equally well under all circumstances, that apparent changes in the chemicals frequently occur without the intervention of any preventible cause. The nitrate bath especially appears to be subject to these vagrant fancies, and after giving a certain class of pictures one day, refuses, under apparently precisely the same treatment, to yield the same results in a few hours or days afterwards. As after once making a nitrate bath in proper condition I do not like to tamper with it, I generally find the simplest way out of the difficulty is the use of another sample of collodion. With this view I generally have in working condition several bottles of collodion, each possessing different characteristics. A valuable means of producing these modifications in the collodion exists not only in varying the base and amount of the iodiser, but especially in varying the amount of bromine. The action of bromine in positive collodion is not simply in accelerating or increasing the sensitiveness, but also in decreasing over-intensity and producing half-tone and softness. By keeping samples of collodion, some of which contain a large amount of a bromide, and produce corresponding excess of half-tone, and others with a small amount of bromide, and great intensity and contrast between lights and shadows, I find I am generally able to meet the changing circumstances caused by varying light, temperature, and condition of the nitrate bath. If the circumstances be conducive to the production of a feeble

picture with excess of half-tone, I find that by using a collodion iodised with potassium and a small portion of bromide, I can generally obtain at once sufficient intensity. On the other hand, if excessive intensity be the fault, I find that by using a collodion sensitised with ammonium or ammonium and cadmium and a full portion of bromide, that softness and half-tone are obtained.

It is necessary to observe, however, that I have generally found a tendency in bromides to injure slightly the tone and brilliancy of the picture. Another effect of the addition of bromides, which I have invariably found, and have never seen any reference to, is its influence in producing a clean picture. Samples of collodion which have yielded dull, spotty, streaky-looking pictures when simply iodised, have given results clean and perfect on the addition of half-a-grain or a grain to the ounce of bromide. I find, also, that collodions which, simply iodised, have become seriously deteriorated in a couple of months, have, with the addition of a bromide, remained in perfect condition, or have even improved, at the end of six months.

I have tried some experiments with the addition of a chloride to collodion for positives, but without sufficiently satisfactory results. I have been inclined to think that the tone of the picture was improved by the addition, but have not repeated the trials sufficiently to speak with certainty.

Sometimes, with a collodion quite new, I find the blacks improved by the addition of a few drops of tincture of iodine. Still better than this for the purpose, I have found the addition of about a drop to the ounce of hydrobromic acid, which rapidly produces on the collodion the effect of maturity.

THE NITRATE BATH.

This, as I have already said, I prefer sufficiently rich in silver to give a creamy film—about thirty-five grains of pure re-crystallised nitrate of silver to the ounce of distilled water. A simple and efficient mode of charging with the iodide of silver, is to coat a large plate with iodised collodion and leave it for a few hours in the bath. If, on trial, a clean, bright picture, free from streaks or fog, be produced, the bath does not require further preparation. This, however, rarely happens; the addition of a quarter of minim to one minim of nitric acid is generally required. I usually commence with the smallest quantity, and increase it, until, on trial, a clear, brilliant picture is the result. The bath once in condition, I find it generally continues so for a very long while, on being filled up, from time to time, with a forty-eight grain solution. If, from long use, a large quantity of ether and alcohol have accumulated in the bath, I pour it into a wide-mouthed bottle or jar, and place this in another vessel of hot water in order that the excess of spirit may evaporate; this I have generally done in daylight, and have found a blackened precipitate. On filtration, I have invariably found the bath work perfectly; beyond this, I rarely like to interfere with a bath once in good condition; and, notwithstanding that I find some variations at different times in the condition of the bath, I do not remember, in the course of many years of photographic experience, to have had spoiled a single ounce of bath by the ordinary process of working.

(To be continued.)

GENERAL OBSERVATIONS ON PHOTOGRAPHIC POSITIVES.*

BY MESSRS. DAVANNE AND GIRARD.

OF FIXING.

This stated, let us examine the manner in which each of the three fixing agents we have mentioned conduct themselves in the three points of view we enumerated at the beginning of this paper.

1. The first question which presents itself is this:—Does the fixing agent remove all the compounds on which the light has not acted? To ascertain this, we prepared sensitised sheets in the ordinary way, and left them to dry; we passed them in the different fixing liquids, and afterwards examined if, on the one part, the sheets thus fixed were still capable of being acted upon by the light, and, on the other, if analysis would reveal the presence of the silver—two different ways of establishing the same fact. By operating thus, we found that cyanide of potassium, used in the proportion of 2 parts of cyanide to 100 of water, left no insoluble compound; that hyposulphite of soda and ammonia acted in the same way on ordinary sized papers, but left a small quantity of silver on albumenised papers capable of producing a slight coloration under the influence of light.

These results present a certain importance; if, indeed, they were pretty well known as regards the first case, they were not as regards the latter. They show that it is difficult to remove every trace of silver salt contained in albumenised proofs, and, consequently, explain the difficulty which photographers often meet with in their attempts to obtain proofs on albumenised paper in which the whites shall be pure and well preserved.

2. We now arrive at the most important and most difficult question in this chapter; and that is, if the fixing agent leaves some substance in the proof which is susceptible of altering it, either immediately or eventually.

We will not trouble ourselves to consider the cyanide of potassium, inasmuch as this body, as we have already observed, presents dangers which we shall detail more clearly when we occupy ourselves with the solvent action it exercises on the coloured parts of the proof; moreover, it is little used in positive photography.

Ammonia, which is used of different strengths, always exercises a special action on the coloured parts of the print. There is no person who has not been struck by the peculiar tones presented by prints fixed with ammonia, and we have several times already had occasion to allude to this coloration, which manifests itself in a constant manner at whatever moment or under whatever conditions it is used in the course of the preparations. Certainly, the distension of the size by the ammonia, and, consequently, the hydration of the organico-silver substance, well explains how the violet tone of the proof passes to a red tone; but it does not explain why the tone of the combination thus produced is so clearly different from that obtained when the fixing is due to hyposulphite of soda. The following facts will, we hope, give an account of this interesting phenomenon:—

When we abandon a liquid containing chloride and nitrate of silver, starch, and ammonia, to the light, there forms, as if on a print, a compound of silver and organico-silver substance; but this compound contains ammonia.

If we take the organico-silver substance obtained by contact of the chloride and nitrate of silver and starch, fix it with hyposulphite of silver, then leave it till it becomes thoroughly desiccated, and afterwards place it in contact with ammonia, it changes colour immediately, and assumes the same tone as proofs which are fixed with ammonia. If, after repeated washings, we examine the precipitate thus obtained, we find that it holds ammonia in combination.

Finally, a print entirely fixed with hyposulphite of soda, then plunged in ammonia, changes tone therein, and assumes the tint of a proof fixed by means of this alkali.

(To be continued.)

BINOCULAR CAMERA FOR THE DRY PROCESSES.

The camera here figured has been designed with a view to extreme portability, simplicity of pattern, cheapness, and easy manipulation.

Fig. 1 is a sectional view of camera, as if cut in two, lengthways, and shows the slide (in side view) in the lower part, and the two lenses in the upper part or body of camera, with the screw to adjust the focus, by taking out the small

* Continued from vol. iii. p. 221

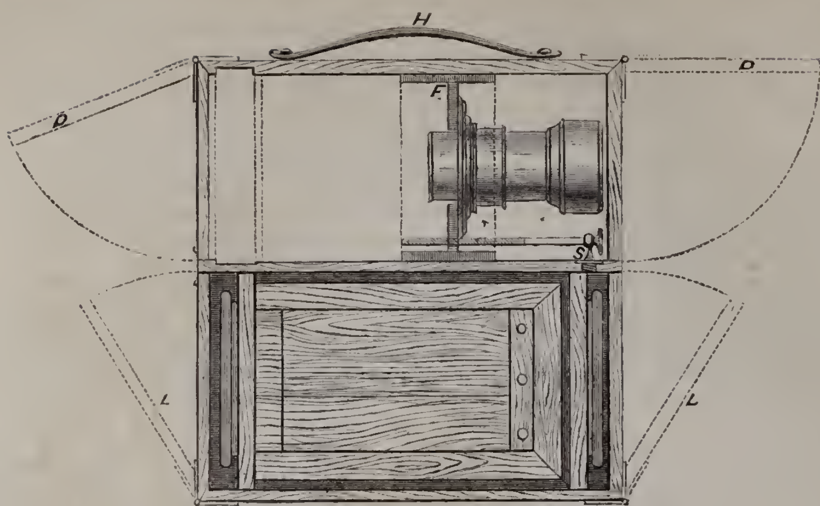
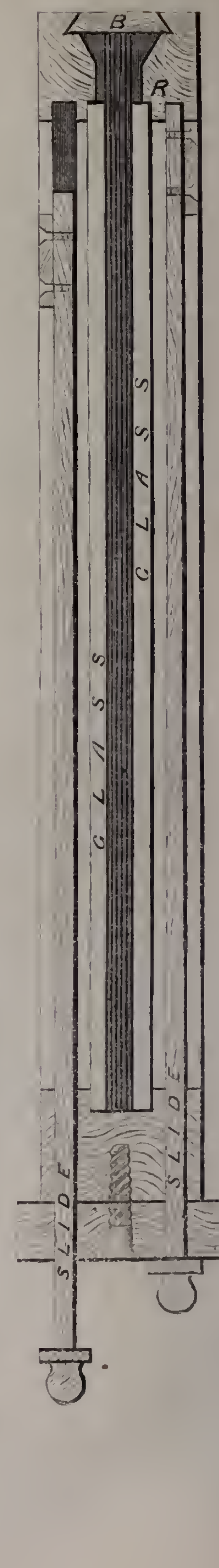


Fig. 1.—Sectional Side View.



Full Size Section of Double Dark Slide for Plates 5½ by 3¼ in.

pin through the shank of screw, and unscrewing the stud piece S, through which the screw works; the pair of lenses, with the frame-piece, F, in which they are placed, can be drawn out of the camera entirely when required. A piece of india-rubber may be fastened to each of the lower doors, L L, just thick enough to press lightly against the shutters of the dark slide when the door is closed, to prevent them from moving during carriage from place to place.

Fig. 2 shows the end of camera, supposing the two doors to be off, the focusing screen in its place, and three of the slides in the compartment below; the other three slides go in from the opposite end, and can be numbered from 1 to 12 in the usual way.

Fig. 3 is a plan of the lower part of camera,

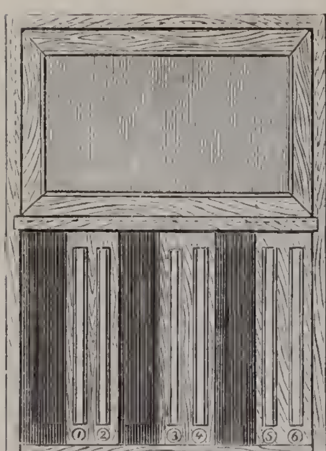


Fig. 2.—Sectional End View.

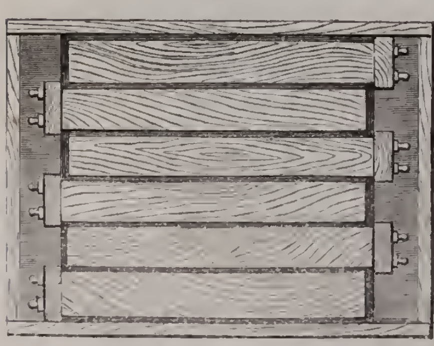


Fig. 3.—Plan of Lower Part of Camera, showing the Six Double Slides.

Fig. 4.

showing the six slides in their position—each slide with a separate groove to run in.

Fig. 4 is an isometrical drawing of camera shut up for travelling, showing the two doors at end, and the leather or brass handle to carry it by.

This camera is drawn for plates 5½in. by 3¼in.; but for those who prefer the usual size plates, 6¾in. by 3¼in.; and I do not know but this would be the most convenient size. The extra 1¼in. you get by using plates of the latter size, leaves room for another double slide, or, what would be better, a single slide made in the usual way, so that the same camera would answer for both wet and dry processes.

The instrument, you will observe, is a plain mahogany box, about the size of 9in. by 9in., and 7in. in width, outside measurement; a partition dividing the box into two compartments—the top part is the camera, and the lower part the packing box for the six slides. Four little doors close up the two ends, as seen in fig. 1. The lenses remain in the camera, so that there is the least possible amount of trouble in putting up your apparatus to take a view—only the two doors D D to open, and the instrument is quite ready for use.

Figs. 1, 2, and 3 are drawn one-quarter the real size, and fig. 4 one-eighth the real size; this was as small as I could conveniently make it to show the parts distinct, and make the plan intelligible.

I have said nothing about the dark slide shown in the plan until last, inasmuch as the slides made in the ordinary way will answer the same purpose; but to reduce the cost of these articles (and, where six are required, no small amount), I have made this drawing. Suppose you take an ordinary double slide in your hand, pull out the two shutters as far as the stop allows, you then see the slide in the drawing, with one exception; instead of being in two halves, and shutting together with hinges, and fastened with brass clasps, this slide is made solid, and has a hole in the end to insert the plates, and which is covered with a piece of beveled and tapered wood, B, to fit flush with end of slide; you therefore save all the expense of hinges and fastenings, and the workmanship therein in fitting them up so as to work well, and it is this workmanship which adds so much to the cost of dark slides.

Now, to insert two plates into this slide, you push out the piece of wood B, and slide one of the prepared plates down; turn over the slide, and it falls into its proper place. Now slide in the second plate, back to back, and push in a piece or two of blackened cardboard between the two plates, or provide single pieces of cardboard or *wood* of various thicknesses, to suit the space left between the two prepared plates, necessarily varying according to the thickness of the plates of glass; there ought to be a slight pressure required to push down the cardboard, so that the plates are kept up to their places in the slide: insert the piece of wood, B, again, over the end of cardboard, and the slide is quite ready for use.

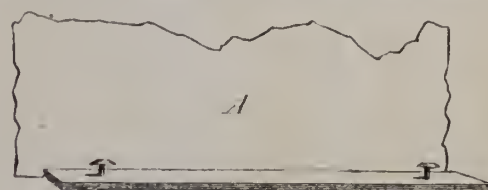
In taking out the plates after exposure, you will observe the little shoulder or return, R, to prevent the plate from being pulled out *with* the cardboard. and so stripping the film from the glass. After the cardboard is removed, the plates go together, and, by gently raising the opposite end of the slide, the top glass slides out into your hand; turn over the slide, and raise the second plate out of the shoulder R, and it slides out also, without any danger of scratching the film.

R. L.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

A rustic background for ladies in walking dress, with dark foliage at the side for light-haired children, may be constructed with great artistic effect, and fine grades of light

and shade, by forming the same of profile set pieces, in the same manner as scenes at a theatre; the pieces fastened to



the floor by a gimlet, through a wooden block, at the bottom of the piece on the back of the set, as A.

The Amateur Mechanic.

GLASS—(*continued*).

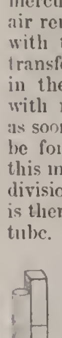
Instead of the scratching diamond, hydrofluoric acid, either in a liquid or gaseous form, is sometimes used for marking the graduation on various kinds of glass vessels. The first step necessary in this process is to cover the vessel to be graduated with a thin layer of bees' wax. The wax should be reduced to the condition of a thick varnish, or thin paste, by adding to it a little turpentine or benzole. The addition of gentle heat will facilitate the process of solution. Every portion of the glass vessel to be marked both inside and out, if open vessels, should be carefully covered with the wax, or it will be acted upon by the acid. If bottles or tubes are under treatment it will be sufficient to cork them well to preserve the inside from the corrosive action. The intended markings on the vessel are then to be made on the wax, scratching it through so as to leave the bare glass. This must be done with a fine steel point; a large needle will serve. Care must be taken that the lines in the wax are clean and smooth, without rough jagged edges, or the lines etched in the glass, will be correspondingly ragged, and indefinite. The glass being quite prepared for

marking, is to be placed in a vessel of lead or gutta percha—the former will be best—with a tightly-fitting cover. The bottom of this vessel must be covered with a paste of finely-powdered fluor spar and sulphuric acid. About half-an-ounce of powdered fluor spar to about two ounces of sulphuric acid is the proportion. It should be mixed with a leaden rod or spatula. The glass should be placed on some support, so as not to come into direct contact with the paste. A moderate warmth is now to be applied, in order to facilitate the generation of the acid fumes. The evenly surrounding warmth of an oven will answer the purpose best; but great care must be taken that the heat be not sufficient to melt the coating of wax or cause it to run. It is scarcely necessary to observe that no other glass vessels should be at hand, or come at all within range of these vapours, as anything of glass would inevitably become dulled and spoiled. The temperature, &c., will influence the action of the acid fumes, and the time required will vary. The etching produced by the vapours of hydrofluoric acid is dead or opaque, and the mark is seen at once on cleaning the glass. This is easily effected by rubbing it with a rag moistened with turpentine or alcohol.

If the liquid acid be used to vessels prepared in the same manner, the marking is more quickly effected, and the lines are deeper; but they are not rough or dead, and require filling in with something to make them sufficiently distinct for practical purposes. The acid for this purpose should be diluted.

It is important to remember that the acid, either in a liquid or gaseous state, is highly corrosive. The fumes should be carefully avoided, the hands being protected by india-rubber gloves when using it in any form. A very slight contact with the skin produces a burn accompanied by the most excruciating pain.

The graduation of tubes, useful for a variety of purposes in the laboratory, may be performed in various ways. In all cases it is a process requiring considerable minuteness and accuracy. As our own practice has not given us extensive experience in this operation, it will, probably, best serve the purpose of the experimentalist to quote here, in a slightly condensed form, a process described by Greville Williams,* an excellent authority in such matters:—"If the tube is regular in the bore, it will generally be sufficient to weigh in mercury to form the longer divisions, and subdivide these afterwards into the desired number of equal parts. It is better, however, to weigh in and mark separately each division. Suppose, for example, that it is desired to divide a narrow tube into hundredths of a cubic inch: a number of small measures are to be made from glass tubes of about ⅛th of an inch internal capacity, and 34·2grs. of mercury being weighed into one of them, and any bubbles of air removed with a wire, a scratch with a file is made on a level with the upper surface. This quantity of mercury is to be transferred to the other tubes, which are to be likewise marked in the same manner. These are all to be filled to the mark with mercury, and may be supported in a glass ready for use: as soon as they are emptied they are to be refilled, and it will be found more economical, with regard to time, to proceed in this manner than use only one measure, and refill it each time a division is made. A strip of paper, about ⅛th of an inch broad, is then to be fastened with glue down the whole length of the tube. Against any convenient part of the laboratory a strip of wood is to be nailed, of nearly the same thickness as the diameter of the tube to be graduated. Exactly at the height of the eye, a piece of stout sheet-copper or zinc is to be nailed against the wood, so as to form a spring to keep the tube in its place while the paper scale is being marked, as at *a* in the figure in the margin. The upper surface of this spring serves as a guide or ruler for the pencil while making the graduations. One of the gauges full of mercury is then to be emptied into the tube, and the latter is to be so adjusted to the spring, *a*, that the upper surface of the latter exactly coincides with the surface of the mercury. With the assistance afforded by the edge, a straight line is then made on the paper scale; and this is to be repeated until a sufficient number of graduations have been made. The graduations on the paper may now be made on the glass by the diamond, each fifth division being somewhat longer than the others." Greater neatness is obtained by etching with the acid. In this case, the



* "Handbook of Chemical Manipulations."

paper scale should be very accurately copied, and the copy glued upon a strip of wood of the same thickness as the tube. A coating of wax, such as we have already described, having been applied to the tube, it is to be placed, together with wood containing the scale, side by side in a spring similar to that mentioned above, as shown in the margin. The lines are then drawn by the aid of the ruler, *a*, from the scale to the tube, with a point laying bare the glass. These lines, when the marking is all completed, may be etched by means of hydrofluoric acid or its fumes, as already described.

We would repeat our caution against inhaling the fumes of hydrofluoric acid, which are very dangerous and also against allowing the acid to come in contact with the skin, as the wounds caused are of the most painful character. For most purposes the writing diamond is much preferable, for whilst its results are not quite so neat, its use is quicker and simpler, and not attended by danger.

Whilst speaking of the writing diamond, we may call the attention of the amateur to a very convenient use to which it may be put: we refer to the writing on all glass vessels the specific use for which they are kept, by which great advantages as to cleanliness and purity of chemicals are obtained. It is also often convenient to mark the exact capacity and weight of bottles in this way. The operation is simple, and requires but little time, whilst it often saves much trouble afterwards.

(To be continued.)

Photographic Chemistry.

COMBINATIONS OF CARBON WITH OXYGEN.

AMONG the compounds formed by the union of carbon with oxygen, we will first consider carbonic acid and carbonic oxide.

Carbonic acid is formed of six parts by weight of carbon to sixteen of oxygen. We have already said that the burning of charcoal in air or oxygen gives rise to carbonic acid gas; but to obtain this gas it is not necessary that we should burn charcoal. Carbonic acid may be obtained from carbonate of lime—a substance which abounds in nature—by simply attacking it with a strong acid. To prepare it, put into the bottle (of which we gave a cut) some bits of chalk—marble is better, if it can be obtained—then fit in the cork, and pour down the funnel tube as much water as will rise an inch or two above the bottom of it. After this, add a small quantity of hydrochloric acid, and this will rapidly attack the marble, and liberate the carbonic acid gas, which should be collected over water. As soon as the effervescence ceases, a little more hydrochloric acid is added, and the liberation of carbonic acid is renewed. As the specific gravity of this gas is greater than that of the atmosphere, it may be collected in vessels by displacement, in this way:—Let the first portions of the gas which come over escape, then insert the end of the tube into a glass jar, until it is near the bottom, partly covering the mouth with a card; the gas will gradually fill the jar, and expel the atmospheric air it contained.

Carbonic acid destroys animal life, and will not support combustion. Very many instances have occurred proving the first of these statements. Scores of persons have died from their ignorance of the fact that the combustion of coke or charcoal in a close room produces this deadly gas; and hundreds have been suffocated in coal mines by this same gas in the form of "afterdamp." A small animal, say a mouse, dropped into a jar of carbonic acid, makes feeble efforts to climb up the sides to escape from the confinement; but these efforts very soon relax, and he lies down and ceases to exist. It does not appear that any pain attends death in this form; indeed, its effect on the human organisation is very rapid, its action appearing to destroy sensation and muscular power. The statements with which we are all familiar, of persons having been restored to life after having been for several hours confined in a close room with a charcoal fire, merely proves that air entered the room through crevices which had been left unstopped.

The specific gravity of carbonic acid gas being greater than atmospheric air, it may be poured from one vessel to another, pro-

vided there is no very strong current of air circulating through the apartment in which the operation is conducted. Advantage may be taken of this circumstance to illustrate the power it possesses of extinguishing flame. Put a lighted candle into a glass vessel, and pour into it the carbonic acid—the instant the gas reaches the level of the flame it will be extinguished, and the operation may be repeated several times, until the greater part of the gas has been dispersed.

Carbonic acid is sometimes emitted from fissures in the ground, especially in volcanic districts, and is likewise produced in great abundance by the fermentation of organic matter. It is to the presence of this gas that water taken from wells dug in the chalk owes its sparkling appearance—water absorbing about its own volume of it. Beyond the quantity of this gas which water absorbs when free, it may have a large quantity forced into it by pressure, as is done in making soda-water.

Carbonic acid is liquefied under a pressure of about twenty-seven atmospheres; the apparatus used being of great strength, and of a rather complex description. A mixture of bi-carbonate of soda and water is made in the generator, to which is added a certain quantity of concentrated sulphuric acid. Carbonic acid is generated, and distils over into the receiver, where it is condensed into a liquid under the extreme pressure. The receiver being partly filled with liquid carbonic acid, which is surmounted by a gaseous atmosphere exercising a pressure of fifty atmospheres, it is clear that if the tap be opened so as to allow of the escape of the acid, it will rush out with great force; and, if it is suffered to escape into the air, it will re-assume its gaseous condition—presenting the appearance of a white mist. If the jet be directed into a thin metallic vessel, a portion of the liquid only evaporates, and, in doing so, it deprives the vessel and the remainder of the liquid of the heat necessary to enable it to re-assume its original condition; consequently, the liquid which passes into the vessel condenses into a solid, assuming an appearance similar to flakes of snow. This solid may be placed on the hand without causing any very painful sensation of cold, because a current of gaseous acid is being constantly liberated from the mass which intervenes between it and the hand; but if it be grasped firmly with the hand, it will cause an exceedingly painful sensation, very much akin to that which would be caused by taking hold of a piece of very hot iron, and the skin will be disorganised. A mixture of this solid gas and ether produces such an intense degree of cold that a mass of mercury plunged in it will freeze in a few minutes.

The proportion of carbonic acid in the atmosphere is very small compared with the other gases; but it exists in amply sufficient quantity to supply the amount required for the support of vegetation—the leaves of plants absorbing it under the influence of light: it has been found in the highest strata of air ever reached.

Carbonic acid is colourless; its specific gravity is 1·524.

(To be continued.)

Correspondence.

FOREIGN SCIENCE.

(From our Special Correspondent.)

Paris, 16th January, 1860.

At Paris a new society has been formed, under the denomination of *Union Photographique, Société de Secours Mutuels*. M. Ernest Mayer is the founder of this useful association, by which each member may render services to those of his fellow members who may be in need of them. The members each pay one franc a-month, or 12 francs a-year.

M. Sans writes to the *Revue Photographique* respecting an easy process on dry collodion, which, according to the author, is certain to meet with the approbation of photographers. The manipulations in this process are as simple as those required for damp collodion; one bath of silver alone is requisite; the time of exposure is very short, since the author has succeeded in photographing, with a plate prepared three days previously, and in wet weather, a stereoscopic view of some dark houses and walls in 20 seconds. The negative collodion employed has for composition:—

Rectified ether at 62 ...	... 84	cubic centimètres.
Absolute alcohol ...	... 28	,,
Cotton	... 1	gramme.
Iodide of cadmium ...	... 1·2	,,
Bromide of cadmium ...	... 0·6	,,

This collodion is very sensitive, and should be manipulated in a feeble yellow light, and not by the light of a candle, for, in this case, the plate becomes quite black during the development. The glass having been collodionised and sensibilised in a neutral bath of silver at 8 per cent., is plunged into a flat basin containing distilled water, where it is left till the greasy lines disappear. The nitrate of silver remaining on the plate is finally washed off by pouring on its surface a little water.

The plate is then placed, the collodion upwards, in a porcelain vessel containing a very dilute and filtered solution of syrup of gum (10 of syrup for 40 of distilled water), where it remains for one or two minutes. It is then withdrawn, and placed vertically upon several bands of blotting paper, the collodionised side towards the wall, and the whole protected from dust. When it has finished dropping, it is shut into an hermetically closing box, from whence it is withdrawn for use.

The glasses thus prepared can be preserved easily. The exposure in the camera varies from four to thirty seconds, according to circumstances. The proofs can be developed immediately, or can remain for a few days. When it is desired to develop the image, it is very important to eliminate all the syrup, which is done by placing the plate in a vessel full of water. When the syrup of gum is dissolved, the plate is covered with the following developing liquid:—

Distilled or rain water	100 grammes.
Pyrogallic acid	3 ,,
Crystallisable acetic acid	4 ,,
Solution of nitrate of silver, neutral, and at 10 per cent.	A few drops.

The fixation is operated as usual with hyposulphite of soda.

In this method, the syrup of gum has the advantage of keeping the collodion attached to the glass. Many other syrups, and similar liquids experimented with in this view, have an entirely opposite effect.

At the opening of the new year, an interesting discourse was read before the Brussels Academy of Sciences by Major Liagre, "On the Plurality of Worlds." It is considered one of the best lectures ever delivered before the Belgian Academy. The question which M. Liagre had proposed to treat, was whether the earth alone, among all the other globes that move in space, is inhabited? This question has been, of late years, the cause of some discussion in England, therefore I shall endeavour to give you a short *exposé* of M. Liagre's ideas on this subject. The author began his discourse by reminding us what were the notions held by primitive races concerning the nature of our earth, and how many centuries elapsed before a proper idea of the planetary system was formed. The pride which causes man to exaggerate his own importance made him believe that the grain of sand upon which he lives was the only world which the Creator had endowed with inhabitants, and that the others were only emblems of sterility and death.

The cosmological rank of the earth has been reduced by science to its proper value; but it was more difficult still to dissipate the vulgar prejudice by which our planet was considered as the only inhabited globe.

The apparently icy immobility of the moon, for instance, does it authorise us to assert that life is absent there? M. Liagre does not think so; he goes farther; he proves by incontestable reasons, that such an assertion is made upon no authority, and has no value. Even when observed with the best and most powerful instruments, the moon is still at a distance from the observer, which may be estimated for the naked eye at about 240 miles. It is, therefore, quite natural that even very large objects escape our view, and that the observer cannot see the inhabitants of our satellite, whose dimensions must naturally be in proportion to the globe they live upon. A time will come, perhaps, when

more perfect instruments will allow us to come into closer communication with the satellite of the earth.

An objection, which is often opposed to the idea of inhabitants upon the moon's surface, is, that the latter is apparently deprived of an atmosphere. But, as M. Liagre has shown, the fact is by no manner of means proved.

M. Secchi, of Rome, has observed an atmosphere.

Air has been necessary for the combustions which have taken place in the lunar volcanoes; water must have been present to form the alluvial strata that are likewise seen upon the moon. To establish, once for all, that the moon has inhabitants, or that she has had some, we have no positive data, no material proofs; we must, therefore, be guided by analogy and probability, until we shall possess such proofs.

M. Liagre proceeds to show that the idea of a plurality of worlds dates from the highest antiquity. He follows the development of this idea from antiquity up to the present day, tracing, step by step, its history in an impartial manner. The lecturer next shows that it is not necessary to establish a concordance between science and religion, in the explanation of the laws which govern the universe. "The heart and the intelligence," says he, "have each their domain; faith and reason must be left independent one of the other." To satisfy those who think that the idea of a plurality of worlds is anti-religious, M. Liagre quotes a passage of a work by Angelo Secchi, of Rome, which has been permitted to be printed and circulated. Here is a passage:—

"It is with a soft emotion that man thinks of those worlds without number where each star is a sun—minister of Divine bounty—which distributes life and happiness to other innumerable beings blessed by the hands of the Almighty. His heart is inundated with joy when he reflects that he himself forms part of that privileged order of intelligent creatures who, from the depths of the heavens, declare the glory of their Creator."

What are the physical characters which lead us to suppose that any celestial body is inhabited? It is necessary that it possess, what the ancients used to call, the elements of nature—that is, water, earth, air, and fire. According to our author, the planet Mars presents these elements. On the surface of this planet have been observed permanent spots of greenish and reddish tints, whence it is concluded that Mars is formed of substances which reflect light in different manners; these substances are, without doubt, continents and seas. The presence of water implies the presence of an atmosphere. Besides these permanent spots, we have others which are endowed with motion; they are situated near the pole, and augment or diminish periodically, probably under the influence of the different seasons. The constitution of Mars appears, then, similar to that of the earth.

"To pretend that the earth alone was made to be inhabited—to proclaim this opinion, which has no other foundation than our pride—is to glorify the creature at the expense of the Creator. . . . But," continues our author, "what would be the use of those myriads of telescopic stars that are seen only by certain privileged observers? Why should the sun distribute days, nights, and seasons, to planets without inhabitants? Why are beneficent breezes (made known by the equatorial bands of Jupiter and Saturn) wafted perpetually over inanimate zones? and wherefore should the moons, which circulate round these planets, illuminate, with their silver rays, vast seas of ice and desolate continents? Matter then would be of infinite extent, and life would only exist upon the small point which constitutes our earth! The idea is preposterous. Matter and life are both universal." So terminates the long discourse, delivered a few weeks ago, by M. Liagre, and which has created no little sensation in Belgium.

A recent number of *Le Moniteur* publishes the following statistics concerning the resistance of ice of different thickness. It must be understood that it is question here of ice which reposes upon water, and not of suspended ice which, having been formed at the surface of a river, for instance, has been left suspended in the air from the water having sunk beneath it:—

At 4 centimètres in thickness ice begins to support the weight of one man.

At 9 centimètres in thickness a detachment of infantry can pass over it.

At 12 centimètres in thickness it supports 12-pound cannon on sledges.

At 16 centimètres in thickness it bears campaign pieces, with their carts and usual load.

At 20 centimètres in thickness 24-pounders can pass without danger.

At 30 centimètres in thickness the ice resists, without breaking, the heaviest burdens.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

The Japanese innkeepers have a high idea of the attractive powers of women; hence, in towns in the interior, I have commonly seen one and sometimes more women standing at the inn door, who invite the passers-by to enter and refresh themselves; these women being usually selected for the purpose on account of their attractive appearance. I remember to have seen precisely the same thing at Greenwich, when I went to see the Sailors' Hospital and the park, during my stay in your country, and I was reminded of this immediately I saw these women in Japan; so strange did it seem to me to see the same curious custom in countries so far apart. It sometimes happens that travellers extend their liberality so far as to invite one of these women to take refreshment at their inn, but this is rare, and in one instance, of which I was a witness, was attended with unpleasant consequences to the traveller, and, ultimately, to the woman also. The occurrence took place at an inn where I was staying. We were in the act of settling our bill, when we heard an immense uproar outside our apartment; of course, we went out to see what it was, and we found that it was occasioned by a man who charged the woman with robbing him of his purse. The poor woman seemed dreadfully frightened, and not without good reason, for the punishment for such offences is very severe, the law, in some districts at least, awarding death, though this punishment is not very frequently enforced in case of robberies of private individuals. The distress of the woman, who was very young, was so afflicting that I would gladly have paid any reasonable amount out of my own pocket to have set her free, but this was impossible now, as she was in the custody of the police; however, at my urgent request, Dsetjuma agreed to go with me to hear the result of the affair, and a few minutes afterwards we were on our way to the magistrate's office. On our arrival there, we found it was so full that there was no possibility of getting in, so we were forced to return to our hotel, and content ourselves with the knowledge that we should be sure to hear the result from our landlord. It had been our intention to proceed on our journey early, but we felt so much interest in the woman, that instead of going on we decided on staying here for the day, and employ ourselves in printing as many photographs as we could from some of the least interesting of the negatives, in order that we might have the plates for taking other views. We had been at work about three hours, when the landlord came in to tell us that the woman had been convicted, but that as the complainant had recovered his money her punishment was light, and it was just going to take place in front of the hotel.

A couple of thick mats were placed for us in the verandah, upon which we could stand and see over the heads of the crowd, and watch the proceedings of the officials upon whom it devolved to carry out the sentence. The woman's countenance was calm—so calm and composed that it seemed to

* Continued from vol. iii. p. 226.

me she must either have received a much lighter sentence than she expected, or else she was stupefied by terror. A square solid block of wood was first laid upon the ground, in the centre of which a post, about six or seven feet high, was fixed, having a piece of board a few inches square nailed on the top of it. One of the officials then removed the woman's clothes, and cut off her hair close to her head; after which she was compelled to mount by a ladder to the top of the post, and take her seat upon it, the ladder being then removed. The next thing done was to nail a paper to the post, inscribed in Japanese characters, stating the nature of her offence, and the punishment allotted to her, and by whom, and winding up with the sentence, "That which is stolen profiteth not." She was then left to be the butt of the obscene jests of the mob for the three hours during which she was compelled, by her sentence, to remain in this position. There was no attempt at violence—no throwing dirt at her; and, perhaps, under other circumstances, the punishment might not have been too severe, but under the burning rays of the sun, which was then shining, her sufferings were dreadful. They fell on her bare head and body until the latter was of a deep red colour; and she was only saved from sudden death by keeping her hands pressed upon her head, to shield it, in some measure, from the intense heat. Her screams were heart-rending, and the manner in which she writhed her body made me expect every instant to see her fall to the ground. By this time, the mob—finding the heat too great to bear—had, for the most part, dispersed, and the poor wretch was left to agonise almost alone. Her shrieks were getting weaker, and one of her hands had already fallen helplessly by her side, when, unable to endure the sight any longer, I left Dsetjuma, and, without saying anything to him, for fear of his making objections, I took one of the enormous broad-brimmed hats which were hanging in the room, and hastily dipping it in a tub of cold water, I ran across the road with it, and offered it to the wretched sufferer on the pillory. She had still strength sufficient left to take it from me, and put it on her head. Finding that nobody made any remark on what I had done, I went and fetched a bowl of water and gave her, and the eagerness with which the poor creature swallowed it was evidence enough of the torture she was undergoing. I never in my life saw so great a change in the appearance of any human being in so short a time as in this woman. Her face was swollen, and her eyes seemed ready to start out of her head, while her shoulders, breast, and legs, presented the same appearance as if she had been roasted; and yet she had not been exposed more than one hour, and had still two hours longer to remain there, according to her sentence. Not wishing to attract more attention to myself than I could help, I returned into the hotel as soon as she had drank the water. I missed Dsetjuma directly, but nobody could tell me where he had gone; so I went into the apartment, which we had made dark for the purpose of fixing our prints in it, and, having removed some of these into a dish of fresh water, and performed one or two other necessary manipulations, I returned to the verandah to see how the poor woman was going on, and then I found that she had been removed, and was being brought across the road, under Dsetjuma's directions. As soon as she had been got into an apartment, the landlady covered her from head to foot with bandages dipped in oil, and laid cloths dipped in cold water on the crown of her head.

I may as well relate here how she happened to be released before the time for which she was sentenced had expired. Dsetjuma, seeing how intensely she was suffering, had gone to the magistrate, and represented that if the woman were kept any longer in her present position she would certainly die, and urged him to give an order for her release. His representations were, no doubt, of greater effect, in consequence of his being himself an official of high rank, and the result was that the police were ordered to take her down.

(*To be continued.*)

DRY PROCESSES.

To the Editor of "THE PHOTOGRAPHIC NEWS."

SIR,—The much-lamented Macaulay, while *slaughtering* an author, says, in the course of the operation, that his victim used more words and arguments in asserting a palpable truism than some men would employ in establishing an absolute paradox.

Your columns amply prove that some photographers, and eminent ones, too, render themselves liable to similar punishment; and if the writer of this could but obtain a dip of the late noble and gifted lord's ink, these said "photos." should receive an instalment of the castigation they so richly merit.

It *does* seem marvellous that an industrious and sharp-witted photographer, as your correspondent "M. N. P. S." unmistakably proves himself to be, should run after every new and trashy "*process*" he hears of, when he has a thoroughly tried, safe, certain, and easily manipulated one to his hand, like the collodio-albumen.

I have developed plates after that method, at various times, up to thirty days, after excitement, obtaining really excellent negatives.

With care (all *real* photographers are *careful*), the proportion of *good* negatives (I need not tell *you* what a photographer means by a "*good*" negative) to bad ones is about ninety per cent. in my hands. What more, then, is wanted? *Any* collodion will do, and the plates cannot be *too much* washed.

Why, then, perplex oneself with "four-drachm" washings, or any other number of "drachms" of water?

And now, to crown all, it seems from the dictum of the champion of the last new process, that the *exposure* must vary with each drachm of water used in washing the plate during its preparation!

Surely this is a joke, or the *reductio ad absurdum*, perhaps.

"M. N. P. S." is a good photographer, evidently much too good to waste his time after every photographic "will-o'-the-wisp" which may meet his eye. Let him be assured by an old and experienced hand, that to follow the Taupenot process with care, assiduity, and faithfulness, is to be rewarded with as much certain, absolute, and unvarying success in the prosecution of his fascinating pursuit, as the most ardent photographer can desire.

I have read the communications of your correspondent with a considerable amount of pleasure; they prove him to be no dabbler in the art, and that he has great facility of composition. They prove, moreover, that he can with stinging effect throw off so much caustic retaliation from his pen as to render him a formidable antagonist. I confess it is presumption on my part to offer him advice, and if one must receive an ignominious thrashing, one prefers the infliction in some dark, out-of-the-way corner, rather than in the open market-place; on this account, I beg of you to withhold my real name, and allow me to subscribe myself, LIGNUM WARD.

Photographic Notes and Queries.

THE AMBROTYPE PROCESS.

SIR,—In sending you the formula used by myself in making glass positive pictures—called, by us, the ambrotype process—I am not going to lay claim to anything new, but to give, in as few words as possible, a plain, easy, and simple method, whereby any person, who has had some little experience, may make as good a positive as is made in this country, and, I believe, the ambrotype is nowhere made better.

No. 1.—PLATE-CLEANING FLUID.

Alcohol, say	5 ounces.
Turpentine	to saturation.

No. 2.—COLLODION.

Alcohol } of each / Ether }	... ...	4 ounces.
Gun-cotton ...	... ...	48 grains.
Iodide of potassium ...	... ...	30 ,,
Bromide ,,	... ...	20 ,,

No. 3.

Alcohol } of each / Ether }	... ...	4 ounces.
Gun-cotton ...	... ...	48 grains.
Iodide of ammonium ...	... ...	18 ,,
,, cadmium	... ...	18 ,,
Bromide ,,	... ...	18 ,,

No. 4.—BATH.

Water	... ...	12 ounces.
Nitrate of silver (crystal)	... ...	480 grains.

No. 5.—DEVELOPER.

Water	... ...	16 ounces.
Protosulphate of iron	... ...	1 ounce.
Acetic acid ...	... ...	3 ounces.
Alcohol	... ...	1 ounce.

No. 6.—FIXING BATH.—Cyanide of potassium.

In cleaning the glass, we use a cloth, having a long nap on one side of it, called Canton or cotton flannel, which should be cut into pieces about 2½in. square; dust on the plate of glass some fine rotten stone, and, with one of the squares of cotton, moistened with the fluid, rub with a circular motion till dry; repeat on other side, then wipe the edges, and go over the glass again with a cloth wet with the fluid, but without the rotten stone; and once again with a dry piece, and you will find it much more quickly cleaned than by any other process. A very handy way of using the fluid, is by having it in a 3 or 4oz. bottle, with a quill inserted through the cork. In the above formula for collodion, some may be astonished at the proportion of bromide; but all I have to say is, try it, together with the bath and developer indicated above, and I think there will be no complaint. No. 2 is, perhaps, the best, taking everything into consideration, but it will not keep so long as No. 3; they will both work much better at the end of a week than when first made. A collodion for the ambrotype is none the worse for being a little coloured. In making a new bath, I do not advise the addition of any iodide, as it will very soon acquire a sufficient quantity; and, when the bath becomes saturated, it is much more liable to cause stains and fog, and is not so sensitive as when first made; should it be necessary to add an acid, always use a pure altical of nitric acid, and be very careful to add no more than is just necessary to prevent streaks. Use a glass bath, and it will need no doctoring. For filtering, use a small bit of cotton wool—such as is used for making gun cotton—moistened with alcohol, and inserted into the neck of the funnel.

The formula for developing will be found excellent, if rightly managed; it is to be poured on the plate. In making ambrotype on glass, or the iron tablet—called, by us, the Melainotype plate—it will be found better to give a little over-time in the camera than not enough, as the picture will come out much more bright; and, besides, there is no more certain way of producing a dirty and brownish-tinted picture than the employing too little time, and the keeping the developer too long on the plate; the picture, if rightly timed, should develop in about ten to twenty seconds; as soon as the face of the sitter comes up distinct on the plate by reflected light, wash quickly and well, and, when fixed, details in the shades will become beautifully distinct, that could not be perceived when developing. The iron tablet requires just the same treatment, with the same bath, developer, and fixing, except that I sometimes add about one-third plain collodion to Nos. 2 or 3, as, in developing, you can tell better when the best result has been attained. The tablet, as made in this country, will not injure the bath, except it may require more often filtering. I find that collodion containing iodide of ammonium will prevent the bath from becoming covered with a scum, as is sometimes observed. As recommended, I turn the bath into a bottle each evening, and do not filter oftener than is required. In fixing, I use a solution of cyanide of potassium of sufficient strength to clear up the picture inside in thirty seconds. It will be found, that after the solution has been in use for some time, the pictures come out whiter than when first made; and, for that reason, it is best, when newly made, to add a considerable quantity of chloride of silver to it. Never throw away an old bath of cyanide of potassium; but when it grows weaker—as it will do on standing—add more cyanide to it, and, should it accumulate dirt, filter it, but the brownish colour it acquires is of no account. A good plan is to use a flat gutta-percha tray; its dark colour assists in observing the action of the solution. In using the iron tablets, care should be observed in cleaning them, as the least grit will scratch them beyond redemption; use a square of cotton, wet with fluid or old collodion, and finish by breathing on the plate; and, after having tried a plate, if it should turn out a failure, clean it at once, for it would be surely spoiled if the impression should be allowed to dry. In placing the plates in the holder, put a glass at their back, as they are liable to be thrown out of focus by the pressure of the spring of the shutter. In finishing a glass positive, we only black that portion of the picture underneath the figure, and, when dry, place a piece of white cardboard at the back, by which means the figure is thrown out in relief, and purity given to the background, which, in this case, should always be a pure white. The collodion side being uppermost, is protected by a mat and an additional piece of glass, and is best unvarnished. I should say that the acetic acid used in the developer is about the strength of Beaufoy's, which can be used in the formula. JEX.

Detroit, Dec. 9th, 1859.

TO CORRESPONDENTS.

G. W. Y.—To prepare oxide of silver, add a solution of pure caustic potassa to solution of nitrate of silver, when the oxide will be precipitated. Pour it on a paper filter, and well wash for some time. The resulting oxide may be preserved for use in stoppered bottles, in the moist state. It will decompose, if exposed to the light.

W. S.—Large-sized portraits are very difficult to take satisfactorily. We think you will obtain better results by using a large portrait lens by a *good* maker, than by trying to take small pictures, and enlarging them afterwards: although in the latter case you will not be limited as to the size you wish the prints to be.

JOE.—You are behind-hand. A "distilled water preservative process" has already been discovered, and, moreover, occasioned some dispute at the time, as to who was the first *publisher* (we cannot call him *inventor*), of so obvious a method. The discovery consists in the fact that a collodion plate will retain somewhat of its sensitiveness when immersed in distilled water.

LANCELOT.—A zinc dish is the best; it should be made double, on the principle of the common glue-pot, and the water may be kept boiling beneath by means of a lamp. A centigramme is the 100th of a gramme, and a gramme is equal to 15·432 grains. A bellows-folding camera is the best.

PHOTO.—An ingenious person could easily manufacture an instrument for his own use, which would be equal in working qualities to any. It is the only means we are acquainted with of taking such pictures.

C. B.—We do not know the address. If your query is one likely to elicit information of general value, we will insert it in the "NEWS," if you will send it.

W. L. S.—The correction shall be made. Perhaps it would be better if you were to get the cuts done by your own artist. We shall be very pleased to receive the promised article.

N.—As far as we are aware, the plan for a camera-stand is quite new. We shall be glad to receive a more detailed description, for publication.

T. R. V.—We could not answer this question without a personal inspection of the lens. Try the effect of placing the stops in different positions.

C. DRAKE.—We think your idea very ingenious. It has succeeded well in our hands.

J. THOMPSON.—We have no idea in what the new discovery consists, but have little faith in its performing all that is stated.

E. J. J.—The ordinary negative developing-solution prepared with pyrogallic acid may be used for developing photographic copies of engravings.

F. O. Y.—We cannot interfere.

L. X.—Received with thanks.

J. TAYLOR.—Try Negretti and Zambra, Hatton-garden.

ERRATUM.—Page 221, line 8 from bottom, *for* "Sylvic acid 8 to 10 grains," *read* "Sylvic acid 16 to 20 grains."

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "PHOTOGRAPHIC NEWS:"—H. H. P.—Sir O.

IN TYPE:—Charles Hoad.—G. H. W.—Oxoniensis.—A. Taylor.

*** All editorial communications should be addressed to Mr. CROOKES, care of Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

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THE PHOTOGRAPHIC EXHIBITION.

As there are no photographs in the present Exhibition of such overwhelming superiority as to eclipse the rest, we propose to deal with the prints exhibited in the order of their arrangement, and with as much detail as is consistent with their merits, reserving our opinion on the Exhibition as a whole until we have had an opportunity of examining the pictures in succession, with the care and leisure requisite to enable us to arrive at a just appreciation.

The attention of the visitor is first attracted by a collection of portraits, which are not passed by unregarded, because one of the frames happens to contain portraits of celebrities of whom everybody has heard, and which everybody would therefore stop to look at, even if they were the production of an artist not possessing the reputation of Herbert Watkins. After these comes a frame containing four views in Surrey, by Alfred Rosling, two of which were taken by the Taupenot and two by the collodion process, and doubtless arranged together with the object of enabling the spectator to form an opinion of the relative merits of the two processes—an excellent idea, which Mr. Rosling has carried out in other instances. Of the pictures themselves, we have only to say that they possess average merit, but are certainly not equal to what might have been expected from this photographer. Their chief interest consists, as we have already observed, in the fact, that they enable us to compare prints taken by a dry and wet process, under, to all appearance, identical circumstances. The difference between them is, on the whole, in favour of the collodion; but this is not so marked that a photographer, forming a conclusion from these prints, would load himself with a tent and other incidental paraphernalia for the sake of gaining so slight an advantage.

A frame containing photographs of mediæval relics, by Captain Tupper, attracts attention from the nature of the objects represented, and furnishes an excellent illustration of the value of photography for enabling the many to judge of the works of art of our ancestors, which are possessed by the few. The prints include a variety of mediæval keys from various counties, the appearance of which leads to the supposition that lock-making was carried by our forefathers to great perfection; also of some "Apostle spoons," of the date 1619, which are somewhat rare now, and sundry other interesting articles.

A view of "Cologne Cathedral," by R. Grice, is a very good picture. The details of the architecture are well rendered; there is a nice gradation of tone, and the whole picture is clear and sharp; it would, however, have been much more effective if the cathedral could have been taken without including a number of houses in the foreground, which do not possess even the negative merit of ugliness. There is another view further on of the choir of the cathedral, by the same artist, which few will care to look at after the first. Before leaving these prints, we would just suggest to Mr. Grice that they would be much more pleasing to the eye if they were toned to a different colour, for, however suitable the thin light-red tone may be for small pictures abounding in detail, it is by no means pleasing in prints of such dimensions as those he exhibits. In striking contrast to the above, as regards colour, is the print No. 16, "A Panorama of Mont Blanc," contributed by Bisson Frères. This is a highly-interesting print, and beautifully executed. From the nature of the subject, there is little half-tone in it, but the purity of the whites is astonishing; their brilliancy is, moreover, heightened by the contrast of the sides of the dark blocks of ice, with the snow resting on their upper surfaces. The appearance of this picture is marred by a broad white line running down the centre, where the parts have been joined—a disfigurement which might have been partly, if not wholly, obviated, by allowing the edges to overlap each other slightly on mounting, so as to have allowed for the contraction of the print in drying.

Mr. Barnes sends a frame containing eight views of Oxford, which possess good detail and half-tone, and are particularly clear and sharp.

No. 19 is a frame containing four views, taken by Mr. Rosling by the Taupenot process. These prints exhibit the same mixed qualities as those previously noticed. The buildings are sharp and clear, but the remaining parts of the picture are more or less obscure, especially the foliage, which has a hazy appearance. In close contiguity to this frame is a print by James Mudd, taken by the same process. In its general appearance it is superior to those by Mr. Rosling; the foliage is rendered with greater distinctness, and, though the shadows are darker than is agreeable, yet the print is a very good one, and attracts much attention. The superiority of the latter over the former, in this instance, may be explained by the nature of the objects depicted. Mr. Mudd had merely to consider the degree of exposure requisite for obtaining the best reproduction of foliage, whereas Mr. Rosling had to expose for buildings as well as foliage; consequently, the exposure which was exactly sufficient for giving the best picture of the buildings, was insufficient for the trees, and it must have been a difficult matter for him to adjust the exact *milieu;* indeed, he appears to have chosen the most difficult subjects, with the view of putting the proof to the severest test possible.

"The Valley of the Wharfe," taken early in the morning, by Lyndon Smith, is, in fact, a study of foliage, and by no means a successful one either. In its general appearance it is hazy and indistinct, and in this respect bears a strong resemblance to a kindred subject by the same artist, entitled "A Study in the Valley of Desolation," which might almost as well have been termed "A Study of Chaos," so far as the distinct rendering of any particular object is concerned. Small portions of the foliage of the tree which fills the foreground are certainly rendered with great beauty, but this only serves to render the hazy, indistinct portions more conspicuous, and these form by far the greater proportion of what it would be an abuse of the word to term a photograph. Forming the most striking contrast with the preceding in every respect is No. 67, also by the same artist. The subject is a view of Knaresborough, and is not only one of the best prints in the Exhibition as regards manipulation, but it is also one of the best-chosen subjects we have yet seen. As a picture it is remarkably good, and, though of unusually large dimensions, the edges exhibit no want of clearness and definition; the only part where this want is perceptible is, to a slight extent, in the upper part of the trees which occupy the centre of the picture. Altogether, it is remarkable for its sharpness, and a peculiar softness and delicacy which pervade it, in a manner seldom met with in a photograph, and which widely distinguish it from those by the same artist already adverted to.

"Preaching at Oxford in the Olden Time" must have been rather unpleasant for both preacher and listeners at this time of the year, if it took place under the circumstances indicated in the photograph of Mr. Nash's painting by

Messrs. Cundall and Downes. The students are seated in the open air, and their appearance, for the most part, is indicated by a number of flat caps, while the preacher is seen holding forth from a niche in the wall. It is a quaint subject, and well rendered. The view of "Abbott's Bridge, at Bury St. Edmund's," by J. Dixon Piper, is a very good print, and would be much better if the road looked a little less like water.

Bisson Frères send several views of the "Palais de Justice at Rouen," which are distinguished by all the peculiarities and beauties which characterise their photographs; but their best and most striking contribution is a print of "The Cloister of Moissac." This is almost the only print which attracts the eye of the casual spectator, which it does, in part, from the strong contrast between the lights and shadows. The row of massive columns, of curious design, are depicted with wonderful effect. The method by which M. Bisson obtains such intensely pure whites would be a secret worth knowing; and he gives them their full effect by printing his pictures of a very dark colour, which amounts almost to a black.

A print of "The Ruins of Abbey Church, at Bury St. Edmund's," by Cundall and Downes, is very fine. Sharp, clear, and distinct in its details, it yet possesses a soft appearance, very pleasing to the eye, which we do not frequently meet with. A picture of the "Norman Tower," by the same artists, is likewise very good, but less effective than the preceding.

R. Cade sends a view of "Castle Clere, Norfolk," which, besides being a very good print, will attract attention from the peculiar architecture. He also sends a view of "Costessy Hall," the seat of Lord Stafford, in the same county, a quaint-looking, old building, which is very well suited for a picture, and is rendered very effectively in that under consideration. No. 44, by J. Dixon Piper, is greatly inferior to his view of "Abbott's Bridge;" its inferiority is evident, not only in the indistinctness of the foliage, but in the choice of the position from which it was taken. It is impossible to look at it without receiving the impression that the tower is in the act of falling towards the spectator, and this takes away all the pleasure which would otherwise have been derived from the examination of a print which, in some respects, is a very good one.

A view of "Stonyhurst College," and another of the "New Buildings, Magdalen College, Oxford," by Roger Fenton, are, as might be expected from so clever a photographer, very good as pictures, but the subjects are uninteresting; and those who hung the prints exercised a sound judgment in hanging them at such a height as to be scarcely visible. We regard with considerably more interest another photograph by the same artist, which bears the title of "September Clouds." The moment of taking it was well chosen, and the print is a very interesting one, and would form an excellent guide to a painter. Nothing could surpass the delicacy with which the lights and shadows are given, which is especially evident in the mass of cumulus which fills the centre of the picture, the white, fleecy appearance of the edges illuminated by the sun contrasting admirably with the dark, sombre appearance of the denser portion of the cloud.

Four views on the Wharfe, near Bolton Abbey, by W. Sykes Ward, are described as having been taken by a modification of the collodio-albumen process. Comparing them with some of the prints taken by the collodio-albumen, without modification, their inferiority is so evident that we would advise Mr. Ward to abandon his peculiar modification, and return to the original process. We are persuaded that if he had adhered to it in the present instance he would have obtained much better representations of the well-chosen subjects he selected for sending to the Exhibition.

A frame containing four views of "Warwick Castle," "Dovedale," "South Porch, Lincoln Cathedral," and "Tintern Abbey," by S. Bourne, gives us an opportunity of judging of the merits of the Fothergill process; and, certainly, if we were to form an opinion from these prints, we should hardly think it necessary to look any further for a dry process. The view of "Warwick Castle" is not very good, but the others are very good indeed, more especially that of "Tintern Abbey,"—a somewhat difficult subject, and one calculated to test the merits of a process rather severely. There is great clearness throughout the picture, the distance being rendered with greater distinctness than in many pictures taken with collodion.

51. "View of Hengrave Hall, Suffolk," is another of Mr. Piper's prints, and very much superior to his view of "Wolsey's Gate;" the gradations of light and shade are very good, and it forms a most interesting picture.

J. H. Morgan sends four views, illustrating the effects of the late "Hurricane at Shirehampton." They are very good as photographs, and they are especially interesting as presenting undeniable evidence of the extraordinary power of the wind. Large trees are seen broken in half, others torn up by the roots, and others torn limb from limb. No words could convey half so forcible a description of the scene as that supplied to us by these photographs. We can hardly say this of a print labelled "View of Carisbrook Castle," by R. Gordon, inasmuch as it is only a view of the gateway. We cannot conceive why photographers should so frequently give us views of this gateway, which they will describe as the castle itself. It would be far better, when they wish to give a view of these ruins, if they were to plant the camera at a distance, and let us have them of a reduced size. At all events, if the ruins occupied a less important position, we should have a good picture, and might derive a more correct idea of their extent and present condition.

J. W. H. Gutch, who is so well known for his photographs of geological formations, sends half-a-dozen illustrations of geological phenomena, which will be interesting to those who are acquainted with the science. They are well executed—the representations of the contorted strata being particularly good. The view of "Conway Castle," by S. H. G., speaks volumes in favour of the Fothergill process; it is an exceedingly nice print, and is the work of a good photographer. The same may be said of a view of "Conway," also taken by S. H. G., by the same process as that employed in getting the view of the castle. "Cowdray Castle," by Lieut.-Colonel Holder, seems well done—the foliage being accurately represented, and the general appearance of the print being good, but it is hung so high that it is impossible to examine it closely.

The view of "Ludlow Castle," by H. P. Robinson, does credit to his reputation, and is far superior to a view of "Ludlow Keep," by the same photographer. In this instance, and it is not a solitary one, the absurd plan has been adopted of separating the photographs of the same spot, so that we meet with the "Keep" in one place, and ten minutes afterwards we come upon the castle itself. This has occurred so frequently, even among the comparatively small number of pictures we have seen already, that we cannot attribute it to accident, but are forced to conclude that they were hung with regard to other considerations rather than the convenience of the public, or the natural desire which everybody has to see the whole of a subject at once. We do not mean that views of the same spot, by different photographers, should be invariably placed side by side—although this might be a desirable arrangement—but that such views by the same artist should be hung together.

In close proximity to the above we encounter the first prints by a lady which we have yet met with in the Exhibition. These are by Mrs. Verschoyle, and they are respectively described as "View of the Entrance to the Port at Nice," "The Port at Nice," "Our Villa at Nice," "In our Gardens at Nice." Two of these prints were taken by the collodio-albumen process, and two by the honey process. They are very fair prints, one having a decided superiority over the others; but they do not show a very marked advantage of the collodio-albumen over the honey proce[illegible].

What advantage there is, however, is in favour of the collodio-albumen.

An instantaneous picture of "A Heavy Sea, at Brighton," by Samuel Fry, is one that is certain to attract attention, notwithstanding it is hung so high that it is impossible to examine it closely. In it we see a steamer forcing her way through waves which wash across her deck, and in the foreground an immense wave is rolling in like a wall. The print has a peculiar appearance, very much as if it were a copy of a painting, and if we did not feel confident that Mr. Fry is incapable of attempting to deceive, we should assume that, if it is not a copy of a painting, it is very much enlarged from the original negative. The colour also is less agreeable than it might have been.

Scattered about among the pictures we have already noticed, are some frames containing photographs of paintings in her Majesty's collection at Buckingham Palace, taken by Caldesi, Blandford, and Co. Some of these copies are very good, but, for the most part, they are indistinct, and it is not easy to distinguish what the painter proposed to represent. We need hardly say that this indistinctness must to a certain extent exist in the paintings themselves, but it has been aggravated in the photographs by reason of the great reduction of the scale of dimensions. Also we observe several frames filled with copies of sketches by Raphael and Michael Angelo, in the Oxford collection, which have been contributed by the Science and Art Department of the South Kensington Museum. These have been very cleverly copied from the originals by C. Thurston Thompson, and are very interesting to lovers of art, and calculated to be of considerable utility to painters. With these, we close our remarks on the Exhibition for the present week.

COLLODION FOR THE DRY PROCESSES.*

BY T. F. HARDWICH, ESQ.

In the first attempts to prepare a collodion suitable for dry processes, it was found that there were advantages in making use of materials like rotten cambric, shreds of filtering paper, old lint, and other like substances, in which the cellulose has undergone partial disintegration by the action of chlorine, caustic alkalies, &c.; a pappy and broken-up structure of collodion being more easily obtainable in that way than by working with the fine cotton wool as it exists in the raw material. Nothing, however, will be said in the present paper on the use of these bodies, since it is now well established that both uniformity of product and stability of collodion are, to a great extent, sacrificed by their employment; and further, that the fibre of linen, being chemically different from that of cotton, does not yield a similar quality of collodion. All must be done, therefore, with the best cotton wool, and we must look to the nitro-sulphuric acid for bringing about the physical and chemical modifications which are required.

The first experiment which gave me a clear idea of the *rationale* of producing collodion suitable for dry processes was made at the time when so much was said of Gaine's process for making vegetable parchment. It occurred to me to try how this modified cellulose would succeed in the preparation of pyroxyline, and I therefore cut a piece of paper into several slips, and floated them upon the diluted oil of vitriol for varying periods of time—five, ten, fifteen, twenty, forty seconds, and so forth, afterwards washing with water, and drying each piece perfectly. The shrinking and toughness of the paper appeared to increase with the time on the acid, and, in the case of the pieces last removed, there was a peculiar jelly-like feeling whilst they remained in the washing-water, as if a chemical change had commenced. Now these pieces of parchmentised paper, on being subsequently dipped in nitro-sulphuric acid at 130°, all yielded pyroxyline soluble in ether and alcohol, but there was a marked difference in the quality of the collodions so made, for whilst the earlier samples gave a fine and tough film, the latter ones—those left longest on the sulphuric acid—produced a collodion which is known as *powdery*, rubbing up under the finger like soft soap, and adhering very tenaciously to the glass. The inference was, that the parchment collodion resulted from the first, or action proper of the sulphuric acid, and that the powdery pyroxyline was due to a subsequent or disintegrating effect of the same acid, which, perhaps, might be a partial change into dextrine. At the time, it seemed to me logical to draw the above conclusion, but facts have since come to light which show that it is not entirely correct.

When it became evident that the sulphuric acid exerted a modifying action in the manufacture of pyroxyline, the next question was, whether a mixture of oil of vitriol and nitric acid could be made in such proportions as to produce at once the full effect, and so to yield a product corresponding to that which is obtained when the fibre is first parchmentised, and afterwards made into a substitution-compound by nitric acid. If this were possible, the action of the sulphuric acid must precede that of the nitric acid, because, although it is easy to make the vegetable parchment into pyroxyline, yet pyroxyline, once formed, cannot afterwards be changed in properties by immersion in diluted oil of vitriol, but is protected, and remains in the acid without shrinking. Therefore, in order to give the preponderance to the sulphuric acid, we make the bulk of that acid relatively greater, and in this way the parchment quality of collodion may be obtained.

If, however, the theory above propounded were correct, that the action of the oil of vitriol has two stages, a condensing and a disintegrating stage, it ought to be quite possible to prepare the porous or soapy pyroxyline in the same acid mixture which is found to answer for the parchment pyroxyline, and especially since we have it in our power to increase the action of the acids *by raising the temperature*. Experiments, however, afterwards proved that this mixture of three measures of oil of vitriol to one of nitric acid was not the best for preparing the most powdery kind of film, and that no increase in temperature, or alteration in the proportion of water, sufficed to give the desired result. Nothing remained, therefore, but to consider the theory afresh, and, on doing so, the weak point soon came to light, viz., that I had overlooked an effect of the *nitric acid*, not hitherto described, and that, to produce the pulverulent state of film in perfection *in one mixture*, the nitric acid ought to be in excess over the sulphuric. It appeared, however, that the most complete disintegration resulted when the nitric acid was brought to bear upon a material which had previously been acted on to the full extent by oil of vitriol; and this explains why, in the experiments with the strips of parchment paper, the latter samples of collodion were so entirely porous, viz., those produced from the material which was at the verge of transition into dextrine before it entered the nitric acid.

Having perfected the theory, it now corresponds with the experimental results, and either quality of collodion becomes obtainable at will; for if in a mixture of three measures of oil of vitriol, one of pure nitric acid of 1·45, and rather more than three-quarters of a part of water, there be immersed cotton at 150° F., the fine transparent, tough material containing a minimum quantity of the peroxide of nitrogen is prepared; to convert which into the powdery pyroxyline we have only to dry it, and dip it for an instant in a mixture of the same acids, and at 150°, but with the proportions reversed, viz., three measures of nitric acid to one of sulphuric, in place of three of sulphuric to one of nitric, the water in the formula being omitted.

In this process, a very short immersion of a few seconds suffices, and there is not much loss from solution; the pyroxyline does not gelatinise in the hot nitric acid, and can afterwards be easily washed in water, but it loses nearly all its tenacity, and flies about in dust when it is dried and rubbed by the finger. Its properties undergo an important

* Read at the last meeting of the Photographic Society.

change as regards the action of solvents, for, whereas it was before unacted upon by absolute alcohol in the cold, it now liquefies into a gummy mass on treatment with this liquid. In collodion the properties differ widely from those of the parchment pyroxyline, the latter setting firmly and quickly upon the glass, but the former being nearly deficient in power of setting, so that, if the proportions of the ether and alcohol remain the same, when you allow five seconds in the one case before dipping the coated plate in the bath, sixty seconds would be required in the other. The parchment pyroxyline forms a somewhat opalescent film on dipping in the bath if the collodion be only moderately iodised, but the powdery pyroxyline produces a dense and creamy film under the same circumstances. If these films be washed with water and dried, the former has a varnished appearance, and may be rubbed with the finger without injury; but the latter is lustreless, and seems to exhibit the iodide upon the surface rather than in the substance of the film. When the sensitive plates are washed with water, and reared up on blotting-paper to drain, the parchment collodion soon assumes a condition in which it is not easily wetted, but the pulverulent film remains without much change, and a solution of albumen, or a developing fluid, flows quite up to the edge, without receiving any check.

Although the effect produced upon the pyroxyline by the second treatment with hot nitric acid is so remarkable, we cannot suppose that any fresh peroxide of nitrogen is imparted to the fibre; three measures of nitric acid of 1·45, when mixed with one measure of oil of vitriol, produce a weaker nitro-sulphuric acid than is usually employed in the manufacture of pyroxyline, as may be proved by the immersion of cotton wool. The wool is rendered soluble at a temperature of 150°, but the film becomes cloudy on drying, and the pyroxyline itself burns in the manner of the compound made in weak acids. It dissolves also in hot glacial acetic acid—a property which Mr. Hadow mentions as peculiar to the weakest of the two substitution-compounds available for photography. This pyroxyline, which is made in one acid only, does not, however, correspond exactly to the other, prepared, as before said, in two different mixtures, although the state of dilution of the nitric acid in the two mixtures is nearly the same; for not only is that which has been acted upon by the oil of vitriol in addition to the nitric acid more broken up, but it yields a very limpid, structureless collodion, which adheres firmly to the glass.

We now pass on to examine the action of these collodions in the dry processes, taking in preference those of Taupenot and Fothergill; and I may mention that the majority of my experiments have been made with the Fothergill process, inasmuch as the plates are readily prepared, and show very characteristic differences in development. It was stated by Dr. Norris, in his early papers on the dry process, that a powdery structure of collodion allowed a ready penetration by liquids, and so favoured quick development. This may be true to a certain extent; but, in my own experience, I have found that energy of development depends much upon other causes independent of physical structure. On comparing the horny parchment collodion with that in which the film is made porous in the mode previously described, it is evident that both yield feeble images when newly iodised, but that the powdery collodion does so especially—not that this image developes more slowly than the other—on the contrary, it comes out rather rapidly, but it has a peculiar *grey tone*, such as would be produced by nitric acid in the bath. This metallic aspect of the image depends upon the pyroxyline, and has nothing to do with imperfect washing, or impurities in any form, which should be carefully guarded against in an investigation like the present. The weaker the acid, and the more powdery the film in consequence, the worse the defect; and, in reflecting on the cause, I was led at length to attribute it in part to the peculiar manner in which the iodide is precipitated in a film of this structure; for, on one occasion, the whole picture dissolved off into the fixing bath, leaving the collodion intact upon the glass, thus rendering it evident that the iodide of silver was not imprisoned by the pyroxyline in the usual manner, but simply rested upon its surface. To overcome this, the same pyroxyline was dissolved in a mixture consisting principally of ether, with only a small quantity of alcohol in the absolute state, and iodised with the cadmium compounds in preference to those of the alkalies. By this proceeding a more contractile film was obtained, which bore rubbing without losing its iodide, and on trial it was found that the intensity of the image was decidedly increased, a brown tone having taken the place of the grey.

(*To be continued.*)

GENERAL OBSERVATIONS ON PHOTOGRAPHIC POSITIVES.*

BY MESSRS. DAVANNE AND GIRARD.

OF FIXING.

These facts are conclusive; they prove that in the ammonia process this base intervenes in a peculiar manner, it combines with the organico-silver substance at the same time that it operates the fixing, and causes it to tone the coloration of this substance in a peculiar manner. Ammonia, therefore, abandons a small quantity of its substance to the proof, which result is important, as it explains the peculiar coloration of prints fixed in this way; but, as regarded from the point of view of its permanency, the quantity of ammonia fixed on the print appears absolutely insignificant.

We will now consider the usual fixing agent, that to which is due, in the majority of cases, the slow alteration of photographic prints. The hyposulphite of soda is used dissolved in water, the solution being more or less concentrated. We shall shortly consider which ought to be preferred; but at the present moment we will confine ourselves to the question: Does the hyposulphite of soda abandon something on the print capable of altering it?

When we fix a print for a proper length of time in a hyposulphite of soda bath, which has never been used, experience demonstrates that the fixing is excellent, and analysis establishes that the fixing agent has not abandoned the smallest substance of any kind on the print which is capable of altering it, either immediately or eventually.

But this clear and precise result is modified in an unfortunate manner under certain circumstances, which may all be brought under two distinct heads, one of which is easy of examination, while the other is of very great difficulty and complexity. It is with the study of this that we shall commence our examination. All photographers are aware that when they pour with precaution a certain quantity of dissolved nitrate of silver in a solution of hyposulphite of soda, a white precipitate appears, which is immediately dissolved; this substance is hyposulphite of silver, AgO,S_2O_2. This is a very unstable body, insoluble in water, and which, directly it assumes a solid state, is decomposed into sulphite of silver and sulphuric acid, according to the formula :—(a) $AgO,S_2O_2 = AgS + SO_3$.

This body may combine with the hyposulphite of soda (and this is what takes place when it dissolves therein), to give rise to a beautiful crystalline salt, but slightly soluble in water, more soluble in hyposulphite of soda, to which Sir John Herschel, who discovered it, gives the formula—(AgO,S_2O_2), $2\ (NaO,S_2O_2)$.

The same compound is obtained in a state of solution in hyposulphite of soda when we agitate a solution of this latter salt with an excess of recently-precipitated chloride of silver. This body, the properties of which had not been precisely stated hitherto, decomposes directly it is placed in presence of an excess of nitrate of silver, and the reaction is that marked (a). It is on these two compounds that the alteration of the prints depends in the case under consideration, and it may be definitively stated by saying: Every time that the fixing by hyposulphite of soda is performed under such

* Continued from vol. iii. p. 233.

conditions that the hyposulphite of silver subsists even for a few seconds in contact with the paper without being able to dissolve itself in an excess of hyposulphite, this salt will decompose in the body itself of the paper, following the reaction (*a*), and, in consequence of the formation of sulphuric acid, will give rise to the decompositions of one equivalent of hyposulphite of soda, (*b*) $SO_3+S_2O_2NaO=SO_3, NaO+SO_2+S$.

The sulphur thus formed will deposit itself on the proof, side by side with the sulphide of silver, in such a manner that not only will a part of the silver on the proof be sulphurised on removal from the bath, but it will likewise bring away with it a second portion of sulphur, which, sulphurising the unassailed silver by slow degrees, will alter the proof, and cause it to undergo an additional sulphurisation.

It is while seeking the conditions under which these accidents are produced that we must direct our attention to them. Some of them are accidental, others are produced normally, when the same bath is employed for fixing too great a number of prints. Let us examine these in succession.

When a print, on removal from the printing frame, is directly immersed in the fixing bath, it ought to be immediately shaken, and the agitation repeated from time to time; without this, in fact, a very large quantity of hyposulphite of silver is formed in contact with the paper; and, not meeting with a sufficient quantity of hyposulphite of silver to dissolve it, it is precipitated, and afterwards decomposes as we have mentioned.

If a large number of sheets are placed in the same bath, almost in contact with each other, without such an interval between them as will allow of the hyposulphite of soda, in contact, being continually changed by the agitation, the same accident happens, and in this case, as in the other, the prints are very probably lost.

An accident of a similar kind, but local, happens, when a bubble of air remains on the paper in the process of fixing. In this case, indeed, the hyposulphite of soda is drawn up through the fibres of the paper, under the bubble, by capillary attraction, and forms hyposulphite of silver in the body of it, which, not being able to dissolve, at once decomposes, and forms one of those yellow spots with which photographers are only too familiar.

We now arrive at the normal causes. They are due to the use of those solutions known under the name of old hyposulphites; and hence we are led to ask ourselves how these old hyposulphites act, and at what moment they become old—that is to say, unsuitable for yielding a good fixing?

(*To be continued.*)

THE POSITIVE COLLODION PROCESS, WITH SOME REMARKS ON THE ALABASTRINE PROCESS.*

BY G. WHARTON SIMPSON.

DEVELOPING SOLUTIONS.

The preparation of these must depend on the class of picture to be produced, as much of the tone of the picture depends upon the developer. The salts of iron are in all cases preferable to pyrogallic acid for positives, giving a better picture with less exposure; even when the latter is used with the addition of nitric acid the picture lacks brilliancy, and the exposure is long. The class of picture produced by development with the protoxide of iron is materially affected by the nature and quantity of acid with which it is combined. I will mention the results given by two or three different formulæ. The first I shall name contains

Protosulphate of iron	15 grains.
Glacial acetic acid	20 minims.

The amount of acetic acid may vary with the temperature from fifteen minims in winter to half-a-drachm or upwards in summer. Very certain results may generally be obtained with this developer. The pictures are bold and vigorous, possessing at the same time sufficient half-tone to give roundness and good modelling. They are, however, especially with a collodion containing a bromide, generally low in tone, having creamy-looking lights and entire absence of metallic lustre. The addition of ten grains of nitrate of potash to an ounce of the developer gives, from the formation of a small portion of protonitrate of iron, a slight accession of metallic brilliancy and whiteness to the picture.

Another developer giving generally very fine results, contains

Protosulphate of iron	20 grains.
Glacial acetic acid	20 minims.
Nitric acid	2 ,,

With a collodion iodised with iodide of potassium, about three-and-a-half grains to the ounce, and as much bromide of potassium as it will dissolve—which is a very small quantity—I have produced exceedingly fine results. Some of the best collodion positives I have seen were produced by this combination.

Another developer contains

Protosulphate of iron	10 grains.
Nitric acid	2 minims.

This gives an extremely metallic picture, with plenty of half-tone, not unlike the general effect of a daguerreotype, but greyer in the whites. If the exposure be at all too short, the picture is covered with metallic spangles; but if carefully timed the results are pleasing, but not so vigorous as those produced by either of the former developers.

The preparation of protonitrate of iron, or rather of protonitrate and protosulphate combined, given by Mr. Sutton,* is an exceedingly fine developer. The formula is as follows:—Dissolve one ounce of powdered nitrate of baryta in sixteen ounces of water, and when dissolved add two drachms of nitric acid s. g. 1.400. To this solution add one-and-a-half ounces of powdered protosulphate of iron. When thus dissolved, filter to remove the insoluble sulphate of baryta. The solution is of an apple-green colour, and contains two parts of protonitrate of iron and one part of protosulphate of iron; a full amount of exposure is required, and the development is rather slow. The resulting picture is somewhat metallic, and very pure and brilliant in tone. This developer is somewhat feeble in cold weather, and may, with advantage, have a still larger proportion of a solution of protosulphate of iron added.

Some of these developers—the first-mentioned especially—may, with advantage to the tone of the picture, be used over again. The principal difficulty this practice introduces, is some uncertainty as to the exact strength of the developer after once or twice using, and of the relative increase of exposure rendered necessary.

The addition of sulphuric acid I have not found in any case an advantage; a large amount of unpleasant sparkling effect, with scarcely any distinction between high light and half-tone, being generally the result.

In each of these formulæ a certain quantity of alcohol will be required; the exact amount will depend somewhat on the collodion film, and more upon the condition of the bath. If the bath has been some time in use, and contains a large accumulation of alcohol, the developer will require a corresponding amount in order to make it flow freely over the plate, without running in greasy lines, each one of which will cause a stain, the result of uneven development. I have found, in practice, that methylated spirits answer perfectly well for use in the developer.

In all cases, I prefer to give just such exposure to the plate as will cause a somewhat slow and deliberate development; a richer, bolder class of picture, with perfect gradation from the highest lights to the deepest shadows, being

* Continued from vol. iii. p. 233.

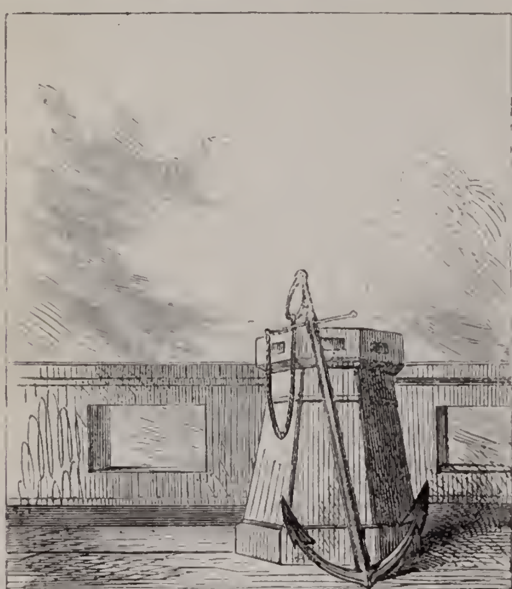
* This differs from the original protonitrate developer of Dr. Diamond in containing excess of protosulphate of iron, and being consequently more active.

produced. Pictures developed at a blow, or with great rapidity, I have generally found flat and worthless.

It is a point of great importance, and one on which sufficient stress is not generally laid, to wash very thoroughly after development before fixing. Having been a great deal engaged in tuition, I have found this a point much neglected amongst amateurs, and not always well attended to by professional photographers. It is a most prolific source of stains. The reason probably is, that it is very common to develop rapidly, and there is then a temptation to hurry the plate into the fixing bath to prevent over-development, as the development, especially in an over-exposed picture, proceeds rapidly, even during the progress of washing.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

All who have visited Portsmouth, Plymouth, Southampton, or any of our seaports, must have been struck with the uncharacteristic and inappropriate backgrounds used for the portraits of soldiers and sailors. A sailor sitting on a chair, or resting his hand on a table, is something like representing a mermaid with a parasol, or an elephant in white silk



stockings. If a sailor must sit, it should be on a chest; but the best effect would be to take him leaning on the capstan. (See sketch.) This could be made by glueing or tacking pieces of mill-board on a square frame, then cutting the required shape with a sharp knife, and having a thick block at the bottom edge; nail it to the floor when required in front of the ordinary white background, or the black one, if the sailor wears a straw hat.

Critical Notices.

Stereograms of Scottish Scenery By G. W. Wilson, Aberdeen.

We think it cannot be laid to our charge that we are over-enthusiastic in expressing our opinion of the pictures we criticise; we believe, therefore, that if, in the following *critique*, we use superlatives in expressing our admiration rather more frequently than is our custom, our readers will not doubt that it is because the prints are exceptional, and are entirely deserving of the praise bestowed on them.

The pictures we are about to consider were taken by Mr. Wilson, of Aberdeen, and are, some of them, of a character entirely new; at least, among the immense number of stereoscopic prints we have seen, we never met with any similar ones. These are really sunset views, and one of them was taken when a part of the sun's disc was actually below the summit of the hills in the distance. This particular print is a view of "Loch of Park," in Aberdeenshire. In the foreground we have water, above which the rushes wave to and fro beneath the wind which ripples its surface, yet there is not the slightest indecision of outline, every rush is distinctly represented, and its shadow is as clearly visible in the limpid element as if one were on the spot. The reason of this sharpness, which is remarkable under the circumstances, arises from the picture having been taken instantaneously. The most extraordinary feature, however, in the print is the water itself. We all know how seldom water is rendered in photography in a manner which pleases the eye, yet we can no longer doubt that this is the fault of the photographer and not of the art, because in this print we have it represented in the most natural appearance conceivable. The rippling waves seem to be chasing each other towards the eye of the spectator, while they gleam beneath the last rays of the setting sun with an almost metallic lustre. Across the bright silvery path of sunshine a rower is in the act of pulling a boat, in which several persons are seated, the shadow of the rower falling directly in the light. Beyond this boat the light is crossed by a dark cloud which slightly obscures the reflection, and renders the unobscured part the more luminous in appearance by the contrast. The edge of the lake is bordered by trees, above which tower the lofty hills which form the background of the view. A curious appearance is evident near the summit, which is, in fact, the faithful reproduction of the luminous haze which is observed in nature to extend some distance down the side opposed to the sun, at the moment when that orb is sinking behind it. Neither are the masses of cloud which partly screen the solar disc without their beauty, while the manner in which they are depicted is deserving of great praise.

The next picture we take up is likewise from a negative taken instantaneously, and is a view of the same lake, with the same hill in the distance, and the same boat in the foreground; yet there is a distinct difference between it and the preceding picture. The sun is higher in the heavens, consequently the reflection of his rays in the water is broader and brighter, and reaches quite to the verge of the picture. There is, too, a dense bed of rushes on one side of it, on the edge of which the trail of light skirts along, and into which the rower appears intent on driving his boat, laden with a party of merry children who have been gathering bulrushes on the lake, and are now, apparently, on their way homeward with their prizes, cheered on their way by the sound of a fiddle, which a man in the boat is in the act of playing. The water in this picture is beautifully represented, but not with the beauty equal to that in the picture taken of the same spot about half an hour later. This is truly charming. A stronger breeze had sprung up in the interval, which covered the surface of the lake with waves. The sun is shining with unclouded lustre, and the reflection is so dazzling that it seems to convert the water into molten silver, and the eye appears to follow it far into the bowels of the earth. Among the rushes, which seem to abound near the margin of this lake, we distinguish, scattered about, the white flowers of the water lily, which enhance the natural beauty of the scene; but it is in this, as in all others, the water which constitutes the real beauty of the picture. We would advise those who affirm that photography is incapable of giving anything but a hard copy of objects, and that the hand of the painter alone can convey an adequate idea of the beauties of a scene, to examine the pictures before us. No hand could depict every wave with the truthfulness and beauty which these present, nor could any colour render with such brilliancy the dazzling reflection of the sun, which, when examined in the stereoscope, has, as we have already observed, a brightness almost metallic.

In the view of Aberdeen Harbour, taken half an hour before sunset, we have a picture of a different character, as regards the objects represented. Instead of the high hills and the row of trees, almost lost in the rapidly approaching twilight, we have houses and other buildings, and where, in the other pictures, we see the rushes and the water lilies, we here see ships at anchor. There is the same peculiarity in this print as in the former, that the negative was taken with the lens pointing towards the

sun, which lights up the centre of the view, and sends its gleaming reflection right across the harbour, to the point whereon the camera is placed. This negative also was taken instantaneously, yet the ships lying at anchor at a considerable distance have every feature as distinctly reproduced as if the operator had directed his whole attention to getting a good picture of them. Every spar and every rope stands out boldly against the sky, the latter looking almost like the delicate threads of a cobweb, yet not one is missing from its place.

The next print we take up is of a different class. It represents a scene of savage grandeur—tall, rugged mountains, whose sides are seamed with the rains of ages, which, here and there, have worn for themselves a deep gully, down which they rush to feed a mountain torrent, which we see in the foreground of the picture, beating itself into foam among the pieces of rock scattered about in the bed of the channel. As we look at this print, we are reminded of the bloody massacre perpetrated amidst its fastnesses by the order of the minister Stair, in the time of King William; when the soldiers, who had eaten and drank with the inhabitants at eve, did not hesitate to burst open their doors at night and murder every human being they could seize; the grey-headed old man and the infant at its mother's breast, the strong man and the delicate woman, were all alike slaughtered. Of the whole clan only some three or four individuals effected their escape.

A striking contrast to the preceding picture of the Mountains of Glencoe is the view of the Tweed above Abbotsford—a quiet, sluggish-looking stream, evidently much reduced in volume by a long succession of dry, hot days, which have caused a good portion of its bed to lay bare. On one bank we have a row of fine oak trees, and the other is bordered with a wood, which is represented with a degree of softness and delicacy which could not be surpassed.

In the views taken in Aberfeldy, we have water again as the principal feature in the picture, but in very different circumstances. In the case of the views already noticed, the water was in a broad sheet, and comparatively smooth, but in these the water is falling from ledge to ledge of rock, and is converted into a sheet of foam before it reaches the level in which it finds repose for a time. In the representation of this water, also, Mr. Wilson has been successful to a degree we have rarely seen equalled, and never surpassed. Moreover, he has been happy in his choice of subjects, and has evidently taken them from the most favourable point of view. The print representing the Upper Fall of Moness, for example, is a beautiful one in every respect. The Fall itself is a considerable body of water, and the hollow into which it tumbles is deep and rocky. On each side of the hollow are trees of various kinds, among which, in spite of the small scale on which they are depicted, it is easy to distinguish beech, birch, and fir, so clear and sharp is the picture. The picturesque appearance is very much heightened by a light wooden bridge, which is thrown across the torrent, just above the Fall. Not at all inferior to the preceding, as regards clearness and gradation of tone, and but little inferior to it in the natural beauty of the scene depicted, is that which represents the Lower Fall of Moness—a series of rocky ledges, down the centre of which the main body of the foaming water tumbles, while, from every salient point near the sides, little streams fall quietly on to the ledge beneath, some twisting themselves into a spiral form, and others dropping gently down, but all rendered with the same distinctness.

We have next three views of Falls on the Garr-valt, Braemar. We have already observed that Mr. Wilson has shown great judgment in selecting subjects, and the points of view from which he takes them; but he is also exceedingly fortunate in having beautiful objects and scenery so near his home; this of itself gives him a great advantage over most of his brother photographers in England. The Falls in these three pictures are less striking than in those above mentioned; but, on the other hand, the surrounding objects render them much more effective as pictures. In one view of the Upper Fall, the eye travels far up the bed of the stream, which is broad, and completely covered with large pieces of rock. On each side grow trees, the dense foliage of which exhibits every degree of light and shade. A light wooden bridge spans the stream, immediately above the Fall, which adds considerably to the beauty of the picture. Another print of the same spot, taken from a different and rather more distant point, gives a more beautiful view of the Fall itself, and is a perfect gem. The light falls obliquely on the naked surfaces of the rocks, and on a heap of large stones in the foreground, which exhibit every gradation of tone in the softest and most delicate manner; and we would advise any painter in search of a subject to procure this picture. The third picture of the Fall differs from the other two: the dense foliage in the foreground impedes the view, but the representation of the water, where it finds its level, at the foot of the Fall, is very beautiful, notwithstanding.

The next print we shall refer to is a representation of one of the greatest natural curiosities in the kingdom, viz., Fingal's Cave, in the Isle of Staffa, a small island on the western coast of Scotland. This great cavern is about 370 feet in depth, and 50 feet wide at the entrance, the height of the arch at the entrance being estimated at upwards of 100 feet. The base of the sides have an appearance similar to lava, and from it spring two ranges of columns formed of basalt, which are so regular as to have an almost architectural appearance, and it is difficult, on looking at the picture, to avoid the conclusion that they have been raised by the hand of man, so evident does it seem that the columns are built of hewn stone. This illusion is strengthened by the blocks of stone at the entrance, which seem to have once formed part of a building. In this print, which exhibits the same delicate rendering of light and shade which we perceive in the others that we have examined, Mr. Wilson has adopted the happy expedient of conveying to the spectator an idea of the height of the entrance by placing a friend there on a block of stone.

Of the architectural subjects contained in this series of stereograms, we shall only notice two, not because they surpass some of similar objects we have already seen, which were taken by Mr. Burns, Mr. Sedgfield, and Mr. Woodward, but because of the interest associated with the objects depicted. They are both views of the interior of Roslin Chapel; and among the sculptured columns there is one termed "The Apprentice's Pillar," far superior in beauty and richness of ornament to the others, to which an interesting legend attaches, and as it is short, and gives an additional charm to the picture, we will relate it:—"The master builder of the chapel, being unable to execute the design of this pillar from the designs in his possession, proceeded to Rome, that he might see a column of a similar description in that city. During his absence, his apprentice proceeded with the execution of the design; and, upon the master's return, he found this beautiful column completed. Stung with envy at this proof of the superior ability of his apprentice, he struck him a blow with the mallet, and killed him on the spot." Whether the master was punished for this barbarous act, we do not remember to have read; but considering how difficult it would have been to have replaced him, the probability is that he was not.

"Waiting for the Tide" is a pretty picture of sand and sea, but it would have been better if it had been taken nearer the margin of the sea, as everything is depicted on such a minute scale, that it gives less pleasure to the spectator than it would if the objects had been nearer the natural size. There is a man on horseback, who is just visible, and two vessels lying at anchor, waiting till the tide, which has just begun to flow, runs more strongly; while another vessel, with every sail set, is seeking to take advantage of the wind blowing, to continue her course against the advancing tide. As an illustration of the minuteness of the objects represented, and at the same time of the accuracy with which they are delineated, we may mention that to the right and left of the picture are two small dark specks but just visible to the naked eye, but which, on being regarded in a good stereoscope, resolve themselves, in one case, into a woman sitting on a rug which she had spread on the sand; and, in the other, to a woman with a little boy walking beside her, and holding an infant in her arms.

A more satisfactory picture, and a very curious one too, is that representing a breaking wave. Two little urchins are enjoying the dash of the waves against their bare legs, while a third, some distance below them, appears to be so intent on staring at the camera as to be unmindful of the wave which is rolling in in a manner which threatens to drench him from head to foot.

The last print we shall notice is a view of a bay, with the Muchals in the distance, and a confused heap of ruins of rock in the foreground; but the peculiar feature of the print is the rising mist, which is slowly creeping up the sides of the mountains. This was taken instantaneously, and the light, fleecy appearance of the mist is admirable.

With this we close our notice of some of the most remarkable stereograms ever presented to us for criticism. They can hardly be said to resemble the greater part of those hitherto published, and it would be difficult to say which we admire most—the wonderful beauty of the pictures themselves, or the skill of the photographer to whom we are indebted for them.

The Amateur Mechanic.

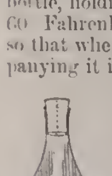
GLASS—(*continued*).

Specific gravity bottle.—Of constant recurrence in the regular practice of the photographer—as well as in his experimental researches—is the necessity for testing the exact strength or purity of various fluids, by ascertaining their respective specific gravities. Apparatus for this purpose may be readily improvised with sufficient accuracy for general purposes.

It will be scarcely necessary to say, for the information of the majority of our readers, that the term "specific gravity" refers to the relation of bulk to weight; that is, a given measured quantity of any body—or, to adhere more closely to the subject immediately under attention—of any fluid, in a given state of purity, at a given temperature, is known to have a certain definite weight, and any variation from that weight, either of excess or deficiency, indicates a certain definite departure from the standard of purity. In order to facilitate calculations of this kind, it has been found convenient to adopt a certain standard representing purity; thus, a thousand grains of distilled water, at a temperature of 60° Fahrenheit, is received as this standard. Any fluid being measured, and a quantity occupying exactly the space of a thousand grains of distilled water being weighed, the relation which this quantity bears to a thousand grains expresses its specific gravity. To take an example familiar to photographers, of a fluid lighter than water, a portion of absolute alcohol measuring exactly the same as a thousand grains of distilled water, at the proper temperature, on being weighed is found to be just 794 grains, and its specific gravity is, consequently, said to be ·794. Any admixture of water with the alcohol at once increases its relative weight, or specific gravity. Thus, ordinary spirits of wine generally possesses a specific gravity of about ·840; and this indicates the presence of 17 parts of water in 100, to 83 parts of absolute alcohol. If, on the other hand, the fluid be heavier than water, as in the case of nitric acid, a quantity measuring the same as a thousand grains of distilled water, at the right temperature, will be found to weigh 1,500 grains; and when it weighs less than this, will be found—providing its purity in other respects has been ascertained, by the application of proper tests, to be correct—to possess a proportionate quantity of water.

There are various modes of ascertaining the specific gravities both of fluids and solids; but the one to which we shall confine our attention is simple and easy to construct as well as to use, and sufficiently accurate for most purposes of the photographer.

The specific gravity bottle as generally made is a flask-shaped bottle, holding exactly one thousand grains of distilled water, at 60° Fahrenheit. Through the stopper is perforated a small hole, so that when filled any excess of the liquid escapes. Accompanying it is a counterpoise of brass, weighing exactly the same as the bottle, water, and stopper. An accurate balance is, of course, required for weighing. The bottle being quite clean and dry, is filled with the fluid to be examined—say rectified sulphuric ether—and, after any excess has escaped through the perforation in the stopper, wiped dry, and placed in one scale, while the counterpoise is in the other. It will be found that weights to the amount of 250 grains will be required to make the bottle and ether equal to the weight of the counterpoise—thus showing that the specific gravity of the rectified ether is ·750; or if, instead of ether, oil of vitriol be placed in the bottle, and the same steps taken, it will be found that the bottle outweighs the counterpoise, and that additional weights, to the extent of about 840 grains, must be placed in the scale with the counterpoise, to obtain an equal balance—thus showing the specific gravity of the oil of vitriol to be 1·840.



There are several difficulties in the way of the amateur constructing just such a bottle as we have described for himself. In the first place, it would be difficult to procure, at all times, the bottle accurately holding a thousand grains, and no more; and, although they might with some trouble be got over by partially filling the bottle with some solid, until it was of the required capacity, it would be difficult to fix on a substance for so adjusting the capacity that might not be acted on by some of the fluids to be tested.

The best plan, therefore, for the amateur to adopt is as follows:—Procure a small flask with a slender neck, or, if that be not readily procurable, an ordinary bottle with as slender a neck as possible, holding little more than two fluid ounces. Placing this in a scale and carefully counterpoising it, add to the counterpoise a thousand grains, and then weigh into the flask or bottle a thousand grains of pure distilled water, at a temperature of 60° Fahrenheit. The water should fill the lower part, and come partly into the neck. When the exact quantity is weighed in, mark with a file, or scratching diamond, the height of the water in the neck—the bottle at the time being, of course, in a perfectly horizontal position. As the surface of the water in the neck of the bottle will, from the capillary attraction of the sides of the neck, be slightly concave, it is better to make two marks, one at the bottom of the curve and one at the top, as in the figure in the margin. The mark on the neck should be quite horizontal with the eye at the time of making it, and at all times subsequently when filling the bottle. A small syringe, or pipette, will be found useful in adding or withdrawing the fluid, so as to bring it just to the mark. When this bottle is filled with the fluid at the proper temperature, there is room for expansion in the liquid, should the temperature of the room be high, without affecting the calculations.

The proper quantity of water is weighed in and the marks made, the stopper should be placed in the bottle, and a counterpoise made to balance the whole. The simplest plan of effecting this, is to have a small tin or brass box, and fill this with shot to the proper weight. If all this be done with proper care, a specific gravity bottle, of sufficient accuracy for most purposes, is thus easily and inexpensively produced.

The temperature of the fluids about to be weighed should be ascertained after placing in the bottle, and then brought to the required condition in this respect. Small thermometers without bulbs, and with the graduation all marked on the glass tube itself, are manufactured for this purpose, and are easily inserted in the neck of the bottle.

As it is important that the bottle should be quite clean and dry prior to commencing operations, it is desirable to wash it carefully out and place it to drain, after each experiment, so as to be quite ready when again required. If it be required for several operations in succession, it will be sufficient in some cases, where the fluids are not antagonistic in their nature, to rinse out the bottle a few times in succession with the fluid to be weighed. Where the fluids are of entirely different character, the bottle should be well washed, and being placed in a warm place for a few minutes; when the water is in a state of vapour, a small piece of glass tube a few inches in length should be inserted through the neck, and the vapour drawn away by applying the lips to the tube. In this way the bottle may be cleaned, dried, and ready for use again without much loss of time. (*To be continued.*)

Photographic Chemistry.

COMBINATIONS OF CARBON WITH OXYGEN.—(*Continued.*)

Carbonic Oxide CO, is formed by the addition to carbonic acid of a quantity of carbon equal to that it had previously contained. It may be obtained in different ways. Take a long porcelain or hard glass tube, and put in the middle some pieces of charcoal, which place over the furnace to get red hot; meanwhile, tie closely to one end of the tube a bladder half filled with carbonic acid, and to the other end an empty bladder of the same size from which the air has been expelled. When the

charcoal is red hot, press the bladder containing the carbonic acid, so as to force it along the tube into the empty bladder, and repeat this three or four times, backwards and forwards. This is not the simplest method of procuring it, but for obtaining a small quantity for experiment, the young chemist will, probably, prefer it to another, as the change in the nature of the gas is brought more vividly to his mind. Instead of employing the above method, oxide of carbon may be procured by heating crystallised oxalic acid in concentrated sulphuric acid. The formula of crystallised oxalic acid is, C_2O_3 3 HO; it may be deprived of two equivalents of water without decomposing, but it cannot be deprived of the third equivalent without being decomposed into carbonic acid and oxide of carbon; and this decomposition takes place when it is heated with a body greedy of water, as concentrated sulphuric acid.

Put a certain quantity of crystallised oxalic acid into the flask, add to it five or six times its weight of concentrated sulphuric acid, and apply heat. The oxalic acid first dissolves, and then effervescence takes place, caused by the liberation of carbonic acid and carbonic oxide in equal volumes. These gases must be passed through a strong solution of caustic potassa, in the manner we have already pointed out, which solution will absorb the carbonic acid, and the gas collected over the trough will be pure carbonic oxide. Carbonic oxide may likewise be obtained by heating carbonate of lime and charcoal together; but the method we prefer, as being the least troublesome, is to heat pulverised ferro-cyanide of potassium in about ten times its weight of concentrated sulphuric acid. The salt is decomposed, and pure carbonic oxide evolved.

Carbonic oxide gas is colourless and inodorous, and has never been liquefied. It burns in the air with a peculiar blue flame, and is converted into carbonic acid. It exercises no action on litmus paper, and combines with neither acids nor bases. It is soluble in water only to the extent of about $\frac{1}{10}$th of its volume; but it is soluble, in a far greater proportion, in a solution of ammoniacal sub-chloride of copper. Carbonic oxide is even more deadly than carbonic acid; an animal placed in a jar filled with a mixture of this gas, in the proportion of about one-part to ten of common air, speedily dies.

The specific gravity of carbonic oxide is 0·970. Its analysis may be easily made in the endiometer, and we find, by introducing therein 100 parts, in volume, of carbonic oxide and 75 of oxygen, that after the explosion of the electric spark, it is reduced to 125 parts; and by introducing a little caustic potassa to absorb the carbonic acid, that there remains only 25 parts, which is pure oxygen. Thus, one volume of carbonic oxide consumes half a volume of oxygen, and produces one volume of carbonic acid. One volume of carbonic acid gas contains one volume of oxygen; consequently, one volume of carbonic oxide contains but half a volume of oxygen.

We have mentioned above that carbonic oxide is of a very deadly nature. It is recorded of Sir Humphry Davy that he took three inspirations of a mixture of this gas, with about four times its volume of common air, the effect of which was to deprive him of sensation for a time. We also find, in an old number of the "Philosophical Magazine," a communication from Mr. Witter, in which he says, that he made three or four hearty inspirations of the gas, having first exhausted the lungs, as far as possible, of atmospheric air, and "the effects were inconceivably sudden deprivation of sense and volition." He remained insensible for half an hour, during which his breathing was stertorous, and his face purple.

Carbonic oxide unites with chlorine to produce chloro-carbonic acid, CO_2Cl, or, as it is sometimes called, phosgene gas. It is made by introducing equal volumes of carbonic oxide and chlorine, both perfectly dry, into an exhausted vessel, which is then exposed to the action of the light, under the influence of which the greenish colour of the mixture, caused by the chlorine, gradually disappears, and the gases combine, with a reduction to half their previous volume, and form a new gas, chloro-carbonic acid. If the mixture be made in the sunlight, the combination takes place immediately, but if the light is merely diffused, it takes a much longer time to complete the operation. This gas may also be obtained by passing carbonic oxide through perchloride of antimony.

Chloro-carbonic gas is colourless; it has a peculiar suffocating odour. It is decomposed by water, and hydrochloric acid and carbonic acid gas is produced.

(To be continued.)

Correspondence.

FOREIGN SCIENCE.

(From our Special Correspondent.)

Paris, 22nd January, 1860.

MM. Davanne and Girard, continuing the photo-chemical researches, have lately made known the results they have arrived at regarding the agents employed for *fixing*.

These agents are three in number:—Cyanide of iron and potassium, ammonia, and hyposulphite of soda. The colouring matters of the proof in presence of these substances are—metallic silver, and organo-metallic compounds of this metal.

Generally speaking, the double cyanide renders positives paler by eating away the black portions and the half tints. Ammonia increases the intensity of the shades and half tints. Hyposulphite of soda has no apparent action; it neither increases nor diminishes the intensity of the obscurer portions. But the authors have not limited themselves to these generalities; they have endeavoured to ascertain, by direct experiment, how the fixing agents act. For this purpose, the cyanide and the ammonia were employed in concentrated solutions, the solution of hyposulphite was at 10 per cent. The following are the results obtained:—

The double cyanide dissolves more or less promptly both of the colouring matters of the proof; its action is, however, less marked upon the organo-metallic compounds than upon the pure silver of the image; the latter is sometimes rapidly devoured. The use of a cyanide bath is often dangerous on this account; it must be employed with precaution; its only advantage is that it leaves the whites very pure and brilliant.

Ammonia—even that which has been used for some time as fixing agent—undergoes no sensible chemical change; it dissolves no metallic silver, or organic compound of silver; but, in course of time, and, according to the authors, on account of its action upon the nitrates and chlorides, it takes a yellow colour, and the substance in suspension which gives it this yellow tint, is then deposited upon the whites of the images and soils them. At the same time, the liquid becomes more and more incapable of producing complete fixation. Hyposulphite of soda acts upon the free nitrate and chloride of silver, and transforms them into double salts which are soluble. In these cases, a double hyposulphite of silver and soda is formed, and this dissolves in the remainder of the hyposulphite. The action is then perfect, until the hyposulphite bath is saturated, when it must be renewed, and its dissolving powers are then lost.

In another paper, which the authors will publish soon, they intend to show how we may determine beforehand the number of positive proofs that can be fixed in a bath of hyposulphite of given composition, without waiting till the bath be saturated and fixation has become incomplete.

On the 26th of December last, M. Balard presented to the Paris Academy, on the part of M. Marié-Davy, the description of a new electric pile, in which salts of lead are employed. M. De la Rive, of Geneva, was the first to employ insoluble substances to absorb the hydrogen generated in galvanic batteries; he used for this purpose peroxide of lead and peroxide of manganese. But neither of these oxides furnish an acid to dissolve the zinc, and their use has not become general. Moreover, an opinion appears to have circulated, that, in order that a pile may work regularly, it is necessary that the substance destined to absorb the hydrogen be soluble. M. Marié-Davy shows that this opinion is erroneous; the substance employed to absorb the hydrogen must be a good conductor, or become so on dissolving in the liquid of the battery. The non-solubility becomes, on the contrary,

an advantage, as it renders unnecessary the employment of porous vessels or diaphragms. The author, to construct his new pile, sought among the substances, which can be found in commerce at a low price, some one that united easy reduction, insolubility, and a certain degree of conduction. And he finds that sulphate of lead and chloride of lead best answer his expectations. The former is very insoluble, and the latter nearly so. The sulphate is the cheapest salt, and the chloride appears to present the most advantages. 33 kilogrammes of zinc, costing 25 francs, will reduce in the pile 144 kilogrammes of sulphate of lead, and thus produce 104 kilogrammes of lead, value 65 francs. There is then a difference of 40 francs, which will nearly cover the cost of the sulphate. The electromotive power of this pile is not inferior to that of a Daniell's battery. Chloride of lead is a better conductor than the sulphate, and yields a much stronger current. The author arranges his battery in columns, like the old pile of Volta. Each element consists of a tinned iron plate, having a disc of zinc soldered to the bottom, outside; the inside is covered with a layer of sulphate or chloride of lead, a few millimetres thick. Each plate is filled with water; the zinc of one element plunging in the water of the element below. A column of 40 of these elements stands about 1 metre high. When the chloride is employed instead of the sulphate of lead, it should be previously melted, and, after cooling, broken up into small fragments. I should not have entered into all these details did I not think that some advantage might, perhaps, be reaped in England by the use of this battery, 20 elements of which have worked satisfactorily in Paris, at the telegraph office, since the 9th of December, where they replace 20 Daniell's elements. Two elements, of large surfaces, were sufficient to work the large induction apparatus of Ruhmkorff; but, for the strong currents, the chloride of lead is much preferable to the sulphate.

At the last meeting of the Academy of Sciences at Paris, M. Pappenheim read a paper on the lymphatic vessels. The investigation of these vessels presents extraordinary difficulties, especially when studied upon the human body, where they can only be submitted to examination for a few hours after death. In other animals, where they may be studied on the living subject, they differ so much from one species to another, that, to acquire any notion of them, their observation must be frequently repeated. The author, after asserting that their principal seat is in the serous membranes, calls attention to the fact, that when these vessels are followed through the other organs, we are struck with the difference existing on this head between the organs. Thus, the spleen is, in the great majority of cases, abundantly supplied with lymphatic vessels; the liver contains less, and the lungs less still. In the diaphragm they are very rare. The horse is one of the animals whose liver is best supplied with lymphatics; the European mole presents another case; with the latter animal the pancreas contains most of these vessels. In the mole, the lymph, which flows from the vessels in question, was always observed to be of a milky aspect, whilst with that of the horse, the colour was generally seen of a yellowish tint. The author intends, doubtless, to complete these interesting data in a future paper.

M. Mathieu, of Marseilles, according to several French papers, has invented the following method of purifying essence of turpentine that is extracted, by the distillation of resinous wood, in closed retorts:—The essence which passes is of a strong brown colour, and holds in suspension from 30 to 40 per cent. of tar; to it is added 2 per cent. of sulphuric acid at 66°, and the mixture is well stirred for a minute or so, and is then allowed to remain quiet for one hour. The clear upper portion is now decanted off with care, and to it is added a little carbonate of lime to neutralise any sulphuric acid it may have retained; it is then distilled in an alembic of copper or iron. The essence thus rectified is as clear as water; it possesses only a slight empyreumatic odour, which disappears after a second's distillation over a fatty oil.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

We had no difficulty in printing as many positives as we required, for the action of the sunlight was so rapid that I found it necessary to print by diffused light. The prints are not to be compared with some that I have seen in London and Paris, but they were none the less wonderful productions to Dsetjuma and those to whom he showed them; indeed, I found that nothing surprised and interested the Japanese so much as these pictures; and once they had seen us at work with the camera, and found that it was by its means we obtained them, they approached the instrument with a certain awe. Evidently, they regarded both of us as practisers of magical arts, and I did not think the worse of their understandings on this account, for most certainly no performance they had ever seen could be so astonishing as the result produced by merely pointing the camera at them or at some inanimate object, for this was, of course, the only part of the process visible to them. What used to puzzle them considerably—and I am not speaking of the middle and lower classes only—was the perspective. A man in the distance they thought a little boy, because he was so much smaller than a man in the foreground. Their ideas on this subject are sadly behind the age, and an artist has no hesitation in arranging his figures, not, certainly, with an entire disregard of their relative positions, but with no more regard for true perspective than is exhibited in Hogarth's well-known engraving. It was, no doubt, owing to this that they never seemed so much impressed by looking at a photograph of a landscape as at a representation of a house or temple, or a group of horses or men. To return to ourselves, Dsetjuma was so pleased when he saw some of the prints mounted, that he wished to stay where we were for a day or two, in order that he might show them to the judge, whose acquaintance he had made that morning. It was agreed that I should go with him, as, notwithstanding the risk attending the possible discovery of my being a foreigner, I wished very much to do so. The prints were carefully folded up and given to a servant, and, mounting our horses, we set out for the judge's residence. It was at no great distance, and we might as well have walked, only that would have been inconsistent with our dignity. The building was hidden among tall trees, and looked delightfully cool. It was open all round, and a verandah, the pillars of which were loaded with flowers, projected a good distance from the wall, and effectually screened the interior of the apartments from the sun's rays. The judge was a younger man than I expected to see, considering his position, but very pleasant and agreeable. His family was not large; there were only three ladies visible, and to these we were duly presented, but in what relation they stood to him I cannot say. Our host accepted Dsetjuma's explanation that I was a native of an apocryphal island on the coast without the slightest hesitation or apparent doubt, so that I was quite at my ease, and felt a good deal of pleasure in attempting to converse with the ladies. They laughed heartily and unrestrainedly at my blunders, and the means I had recourse to occasionally to make them comprehend my meaning. I enjoyed my visit amazingly, and we, that is, Dsetjuma and I, faithfully promised to come back by the same road and pay them another and a longer visit.

Just before reaching the mountains which we were compelled to cross on our way to the sea, we came to a very rapid river, which was also very deep, so that we were obliged to go to a place named Sukku, before we could find a ford. This was only a little village, so there was no bridge across the stream, and we were, therefore, obliged to ford it, which was not accomplished without risk. It is true there was a broad, flat-bottomed boat here, for the conveyance of passengers across, but the rapidity of the river was such a few days previously, that it had carried the boat away from its moorings, and floated it some distance down the stream until

* Continued from vol. iii p. 239.

it was stopped by some trees which overhung the water. To row it up the stream they found impossible, so they had brought it back by land, and during the journey the bottom had been so much damaged that it was under repair at the moment of our arrival. There were three men stationed at this ferry, who had a monopoly of the traffic, and upon them devolved the duty of taking us across safely. They offered us two methods of going across: to go over on foot with their assistance, or to ride over on our horses. I decided on riding across, as being the quickest and least dangerous way; accordingly, a piece of rope was tied round my horse's neck, which the ferryman laid across his shoulder, and, having taken off my shoes and socks, we commenced to ford the stream. I carried a light pole, that had an iron spike at the end, which I was directed to keep near the bed of the river, so that in the event of the water threatening to sweep the horse off his feet, I might assist him in resisting the force of the current. This assistance he needed several times before we succeeded in reaching the opposite bank. As to the ferryman, he was of little use, except as a guide, for, being a little fellow, the water rose above his shoulder, and he had quite enough to do to prevent himself from being carried away by the current; while, at the same time, he had the additional anxiety caused by the reflection that if any accident happened to me, he would be responsible for the consequences, and that, in the event of its being fatal, it would go hard with him, and he would be a lucky fellow if he escaped with his life; for, according to the letter of the law, a ferryman is punished with death if one of those whom he undertakes to carry over happens to be drowned in the passage. This law seemed to me very harsh; and I suggested to Dsetjuma that it would be a very hard case for the poor fellow, if he were hung because a man happened to be drowned in crossing under circumstances like those which existed on the present occasion; but Dsetjuma took a different view of the case; he replied, that there could be no excuse for the ferryman, because it was his business to know whether the river was fordable or not; and that the law was a good and just one, for, otherwise, the number of fords, in certain districts, was so great, and the travellers (many of whom were merchants, carrying valuables) so numerous, that the ferryman would be tempted to drown passengers for the sake of what they carried about with them. As it was, notwithstanding the severity of the law, there was good reason to believe that passengers were murdered by these men occasionally. He related an instance of this kind which had been discovered shortly before I met him, which had happened at a ford on the very river we had just crossed. A travelling merchant, with his young son and a servant, arrived at a town about an hour's journey from the ford, and having business to do here, which he thought would detain him until the following morning, he wrote a letter and gave it to his servant, with directions to take it to a friend who lived some three hours' journey on the other side of the ford. It happened, however, that the persons whom he expected to see were absent from the town, and he therefore decided on continuing his journey. The next day passed, and nothing being seen of him by his friend to whom he had written, he dispatched the servant to look after his master, thinking he might have been taken suddenly ill. The servant found that he had left the town, and he returned thinking that his master must have gone to some other place, and that he should find him at the place whence he had started. He did not fail to make inquiries on his way, however, and learned that a merchant had been seen going in the direction of the ferry riding on a horse, with a packhorse on which a little boy was mounted. The servant did not doubt that this was his master, but when he inquired of the ferrymen they declared they had not seen any such persons. This assertion astonished the man, and a faint suspicion arose in his mind that his master had been murdered; however, he took care not to express his suspicions, and, after a little while, he started for the ford by which we had crossed, fearing to trust himself with the men whom he now suspected of being murderers. He made the best of his way back to his master's friend, and told him what he had heard. The next day they went to the magistrate of the town and related all the circumstances to him, and he at once issued an order for the arrest of the ferrymen. A strict search was made in the houses of the suspected men, but nothing was discovered which tended to prove their guilt. They were imprisoned, notwithstanding, and in the meantime the police made inquiries, which led to its being proved beyond doubt that the merchant had arrived at the ferry, but nobody could be found who had seen him after he had crossed. The river was dragged for some distance below the ferry, and at last the body of a horse was drawn up. The condition of the body showed at once it had not been drowned by accident, for not only had it several large stones fastened to it, but, to prevent its rising from the bottom, its belly had been ripped open. The servant identified the body at once, as being that of his master's horse. Though they could not find the bodies of the merchant or his son, this was considered sufficient evidence of the guilt of the ferrymen, who were thereupon thrown into a cell, and ordered to be kept without food until they should confess. One of them strangled himself after he had been here two days, but the other suffered the pangs of starvation without uttering a complaint. Every morning an official came to him and asked him if he would confess, and every morning received the same reply from the wretched prisoner—"I am innocent; but kill me, and put me out of this dreadful suffering." At last, his persistence raised the impression that, after all, he might be innocent, and that all the guilt rested on the man who had committed suicide. At any rate, he was all but starved to death, and would not live many hours, if kept without food; and therefore it was necessary to come to some decision. A last effort was made to induce him to confess, and this failing, he was given food, and, as soon as he recovered his strength sufficiently, he was set at liberty. For all this, he was not the less under the eye of a member of the police, although he was not aware of it. His every movement was watched; and eventually it struck the official that the ferryman made visits to the barrel sunk in the ground, the use of which I indicated some time ago, more frequently than was necessary. A closer watch at those times enabled the official to perceive that he invariably threw in dirt at every visit. This was enough to induce him to act; he procured assistance, made an examination of the contents of the tub, and discovered the bodies of the merchant and his son, together with a considerable sum of money, which had been hidden with them for safety. A search was made for the ferryman, but he had escaped beyond their reach; they could see him struggling in a deep part of the stream for a minute or two, and then he sunk, and was seen no more, until his body rose to the surface miles down the river.

(*To be continued.*)

Photographic Notes and Queries.

PHOTOGRAPHIC EXCHANGE CLUB.

SIR,—In arranging the conditions under which your subscribers could exchange stereoscopic pictures with each other, you made mention of a plan by means of which they might be enabled to exchange prints of larger dimensions. This plan appeared to me very acceptable, and I should be glad if you would publish this letter in order to recall the attention of members of the Stereoscopic Print Exchange Society to the subject, as it might elicit from some of them a desire in accordance with my own. I am extremely well satisfied with the result of my exchanges of stereoscopic prints on the whole, though I have received some prints which were certainly not first-rate; but I do not complain of this, for, if they were not the best prints imaginable, they

usually represented objects or scenes which were new to me, and therefore, more or less interesting.

A Member of the Stereo-exchange Club.

P.S.—It must be a condition of my exchanging prints, that a specimen should be sent to the "Photographic News" Office by each photographer desiring to exchange, for a competent opinion as to whether the subject has sufficient merit to be admitted to the right of exchange, as the exchange of large-sized prints is a more important matter than that of stereograms.

THE METAGELATINE DRY PROCESS.—POSITIVE PRINTING.

Sir,—In a recent number of the "Photographic News," "D. H." states that the pictures of the Rev. C. P. Cleaver are produced by the gelatine-preservative process. In this I believe he is mistaken, as, till quite lately, I have always heard of Mr. Cleaver as one of the warmest advocates of, and one of the most successful operators among, those who practise the *metagelatine* process as described by me long since; the gelatine process, essentially so called, being that invented by Dr. Hill Norris. I do not know much of this process, having tried it so little as to be hardly competent to give a fair opinion as to its merits; but in respect to my own process of the metagelatine, I would draw your attention to the pictures exhibited by me at the rooms of the Photographic Society. These pictures are nearly all produced on the dry metagelatine plates; and as special examples among them, I may notice the view of St. Sebastian, and that of Bagneres de Bigorre, and of St. Jean Pied de Port, as examples of my process. The metagelatine process, as I now use it, is as rapid as any other of the dry processes, and extremely simple in manipulation, while in point of artistic perfection, half tone, and fineness of detail, it surpasses all wet ones, and I know of no other process so certain in its results.

Allow me also to add one word on the subject of positive printing in respect to the two papers by "R." in your number of January 6th, and that of "Θ." in the number now before me, for January 13th. The addition of acetic acid is wrong, as "Θ." remarks, but not, in my mind, so much in consequence of its coagulating the albumen as in that it causes the sensitised paper to embrown on keeping. The albumen is alkaline, from the presence of soda, and when the acetic acid is added, an acetate of that base is formed in the albumen. Paper albumenised on such a bath, and subsequently sensitised, leaves more or less of acetate of silver dissolved in the nitrate bath, and retains some of the same salt, which is formed by double decomposition with the acetate of soda in its pores. The presence of acetate of silver in positive paper is very detrimental to its keeping qualities. Next, I would beg to offer my testimony against what "Θ." says as to the proportion of salt to be added to the albumen. My experience (and it is, I suspect, as long at least as that of "Θ.") goes to prove that three per cent. is the minimum quantity of chloride of sodium which should be dissolved in the albumen, four per cent. being the proportion I always employ myself. The use of carbonate of soda is, as "R." states, "wrong in principle," and, if this salt be added to the toning bath in large quantity during hot summer weather, it will be found to have a tendency to dissolve the albumen, and the proof becomes rotten, and tears easily in the subsequent fixing and washing baths. Phosphate of soda has not the same injurious effect, and answers as well, or better, in every other respect.

Bagneres de Bigorre. F. Maxwell Lyte.

THE LENS COMMITTEE OF THE PHOTOGRAPHIC SOCIETY.

Sir,—Some little time since, at a meeting of the society, a committee was formed to decide the relative merits of the photographic lenses of the various manufacturers. From this circumstance, the public were naturally led to suppose that, at the next exhibition of the society, they would be able to judge for themselves from the many specimens there shown. On Thursday I was at the private view, and it was a general complaint that there was not in a single instance the maker's name of the lens by which the photographs had been produced. This is a great oversight, and the sooner the fault is remedied the better, as it would not only be an act of courtesy to the maker, but of great assistance to the profession generally. J. S. Eidmans.

CLEANING VARNISHED PLATES.

Sir,—I have found collodion a good and easily-applied cleanser for scratched or otherwise spoilt pictures on glass, when varnished; a few drops poured on the plate immediately dissolves the varnish, and a little rubbing effectually clears that and the film from off the glass.

Oxoniensis.

CUTTING OUT STEREOGRAMS.

Sir,—Most of your readers who do a little in slides, will find that by making a shape of thin *sheet horn*, such as is used for stable lanterns, and cutting, by means of a sharp pen-knife, after placing the horn over the print on a piece of thick *glass*, that they get clean edges, and, from the horn being semi-transparent, this "wrinkle" allows the print to be seen and cut fair and square—'tis one that *will do*.

A. Taylor.

ROUGHNESS OF FILM.

Sir,—Having read "W.'s" notice on the "Roughness of the Film," I thought, having been in the same difficulty myself, that I could render some assistance. Hold the plate by the fire till hot; then rub with chamois leather till cold enough to flow with collodion, and the result will be satisfactory.

I have had some splendid pictures since I adopted the above plan. Charles Hoad.

TO CORRESPONDENTS.

H. T. T.—1. A full description of the method of recovering silver from washing waters, &c., will be found at page 267 of our first volume. 2. See the same paper, also, for a means of recovering gold. If sulphate of iron is added to a solution containing gold, the latter will be precipitated in the metallic state. 3. It will entirely depend upon the substance forming the stain, and the kind of material upon which it has fallen. Try dilute carbonate of soda.

Cam. Cam.—We do not think that wooden cameras will ultimately be found to be best suited to a hot climate, owing to the ravages committed by insects on them. We have heard of the entire woodwork of a photographer's "complete apparatus" being eaten up in this way in a few days, nothing being left but the glass and metal work.

William.—Allow a strong solution of cyanide of potassium to remain in contact with the dirty surface for several hours; and then, after washing, soak in dilute nitric acid. Well wash afterwards.

Lorimer.—See our first volume, pp. 268, 274, 282, 293, at all of which places will be found useful information on the subject of the reduction of silver residues.

Theta.—The print is beautiful; the colour is as fine as any we have seen. Your letter was received with many thanks, and has been forwarded to its destination.

A Tyro.—We cannot refer you to a better description than a very detailed account of the methods of constructing a photographic glass house, which recently appeared in our columns.

G. Maull.—The specimens of paper and pictures printed thereon are excellent We should be glad of further information on the subject.

G. H.—We cannot answer the question without more specific information. It is possible that the lens, collodion, and bath, may be each in fault.

F. Y.—See Mr. Simpson's article on the subject, commenced in our last number.

J. Parker.—Received. Your name shall appear in our next list, which we hope soon to publish.

Z. Charayabonyanski.—We hope soon to be able to give some information on the subject. It is a dry process on glass

Photo.—Caustic ammonia.

T. S. K.—Received.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—F. R. S.—Hypo.—T. R. Y.

In Type:—Expectans.—H. M.—Thomas Clarke.—J. Prideaux.—Oxoniensis.—G. H. W.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 74.—*February* 3, 1860.

THE COMPOSITION OF THE PHOTOGRAPHIC IMAGE.

BY F. HARDWICH, ESQ.

As the question of the action of light upon chloride of silver is one of fundamental importance to the photographic chemist, permit me, through your columns, to take objection to the paper of M. Van Monkhoven, which you have lately translated. This gentleman undertakes to show that the ultimate result of the insolation is metallic silver, and considers that other chemists have failed in demonstrating this, for the simple reason that they have not employed enough light. Are the experiments of M. Van Monkhoven, however, on which he bases his opinion, reliable? It seems to me that they are not, and for the following reasons:—

In the first place, I object to his preparing the sensitive surface by acting on metallic silver with chlorine, since it is known that the photo-chemical properties of the compound so obtained are quite exceptional. Is *iodide* of silver, for instance, the same, photographically speaking, in the daguerreotype process as when formed in the moist way by double decomposition? Certainly not! So neither does chloride of silver, prepared by means of chlorine gas, correspond to the material which is precipitated on mixing salt with solution of nitrate of silver. To show the uncertainty of the former method, I may mention, that on placing silver leaf in gaseous chlorine until it became perfectly white, and afterwards expelling the excess of the gas, I found that the product was comparatively slightly affected by the sun's rays. The same fact has been noticed before by a well-known chemist, who stated, with regard to chloride of silver formed in the dry way, that it was quite insensitive to the action of light. These results do not tally with M. Van Monkhoven's experiments; but possibly the two might be reconciled, if we were to consider how far the action of the chlorine was carried in each case. Clearly, however, the process is not sufficiently understood to be chosen as the basis of an illustrative experiment.

Secondly, M. Van Monkhoven speaks of light concentrated by lenses and mirrors; but this we cannot for one moment permit, since we find, from our own observations, that the compound known as "subchloride of silver" is decomposed by *heat*. Therefore we should anticipate that in the focus of a lens this subchloride would split up into protochloride and metallic silver; that, in fact, heat and light acting together would by degrees expel the whole of the chlorine.

In the third place, an allusion is made to chloride of silver supported on *collodion*; but neither does this satisfy us, for although pyroxyline is comparatively inert to the salts of silver, and forms a useful material for a lecture-table experiment, it nevertheless retains enough of the organic quality, in respect of nitrate of silver, to preclude its employment in a delicate investigation like that which we are considering.

The correct mode for M. Van Monkhoven to follow, as we esteem it, will be to precipitate the chloride of silver from pure aqueous solutions, and to expose it simply to the sun's rays. If he obtain a product soluble in nitric acid, he will prove his opponents to be in the wrong. We do not believe, however, that any such result will follow; for even those English chemists who have advocated the same views as M. Van Monkhoven, viz., that the ultimate action of light upon chloride of silver is to eliminate the whole of the chlorine, have never affirmed that the product is soluble in cold dilute nitric acid. On the other hand, they have allowed that it is unaffected by this re-agent, and have been compelled, in consequence, to assume that metallic silver may exist in a "passive state," in which nitric acid is without action upon it.

We trust that M. Van Monkhoven will see the force of this reasoning, and repeat his experiments in another form; if he do so, it may end in his being convinced that light, unaided by heat or organic matter, will separate a portion, but not the whole, of the chlorine contained in the protochloride of silver.

THE PHOTOGRAPHIC EXHIBITION.

SECOND NOTICE.

If those who, without having studied the subject except theoretically, affirm that photography is a mere mechanical art, were to carefully examine the prints displayed in the present Exhibition, we think they would find it difficult to retain their opinion. Any person capable of distinguishing the peculiarities of a photograph would be able to select a print of either of the first-class photographers with whose works he was acquainted from a host of others. In the present Exhibition, for example, what resemblance is there between the works of Fenton and White, and Cundall and Downes, Maxwell Lyte and Bisson, and other first-rate men whom we could name? The difference between the prints of the first-named is as great as between a painting by Millais and one by Turner in his latter days. What photographer sends prints which could be mistaken for Maxwell Lyte's? and could anybody find a difficulty in recognising a photograph by Bisson? Each of these artists' prints has its peculiarities, which distinguish one from another almost as broadly as the distinction which separates the paintings exhibited at the Royal Academy.

The copy of the painting, "The Suspected Note," by Cundall and Downes, is a very interesting illustration of the value of photography for multiplying copies of paintings. The unconcerned manner of the young woman who is examining some article of drapery contrasts admirably with the anxious, half-frightened expression on the face of the man who has offered the bank-note which has excited the suspicions of the old shopkeeper as to its genuineness. A copy like this is worth any number of such photographs as Mr. Robinson exhibits in its immediate vicinity, under the title of "The Gleaners," "The Cottage Window," "Preparing to Cross the Brook." What could have induced him to send such prints as these to the Exhibition—unless it were a desire to teach us "what to avoid in photography"—we are at a loss to conceive. "The Cottage Window" conveys no sentiment, and there is in the print itself nothing to render it attractive. "The Gleaners" represent two girls lying down in a wheat field, in attitudes as ungraceful as could well be imagined, and which have not even the merit of being positions likely to be assumed by a couple of girls desiring to rest themselves. They are stretched on their backs, their upturned faces exposed to the full glare of the sun, and the arm of one of them extended to the utmost to grasp a handful of her companion's petticoats. There is an appearance of stiffness about the pair which conveys to the mind of the spectator any idea but that of *rest*. But if this is bad, what shall we say of "Preparing to Cross the Brook?" Here we have a narrow

strip of water in the foreground, and beyond it three girls, who are chiefly remarkable for their extreme ugliness, and the extent to which they exhibit their legs. The grouping is bad, and certainly conveys no idea of its being the intention of more than one of the party to cross the brook. The centre figure is seated, and has removed her shoes and stockings, thus displaying legs which are painfully deficient in model, and feet which appear large enough for a woman of Patagonia; one of her companions is seated on the ground; her leg—which we mistook for the trunk of a tree at the first glance—extended at right angles with her body; and as to the third figure, it is to be hoped that no very long exposure was necessary, for, if so, she must have incurred an imminent risk of an attack of apoplexy, lying, as she was, on her back on a piece of stone, with her head hanging down in the position in which we have seen Isaac depicted at the moment when his father, Abraham, is about to apply the knife. The whole attention of the photographer having been directed to getting a good picture of the figures, the background has been sacrificed, so that there is nothing to compensate for the failure in respect to these. We are really sorry to have to speak of these prints in this manner, and we shall be glad if we find any others of similar subjects in the Exhibition, by the same artist, deserving of more favourable criticism.

The "Moulin aux Cascades," by Maxwell Lyte, represents the back of a mill from which the water is rushing out through two openings with a fury almost equal to the Ranelagh sewer at low water. The print has some good features, but is not equal to the generality of Mr. Lyte's pictures; moreover, it is badly mounted. The "Cascade d'Enfer," by the same artist, depicts a fall of water, which, from the name, one would imagine to be terrific, but it is, in fact, a very mild affair, and there is certainly nothing of the *inferno* about it. However, it is to be presumed that the photographer is not responsible for the name, and he has succeeded in producing a very good picture, especially as regards the foreground.

"Ledr Bridge" and "The Barked Oak" are two prints of considerable merit by J. H. Morgan. Of an agreeable tint, and great clearness in the representation of the principal objects of the picture, yet they are not without defects. The whole attention of Mr. Morgan seems to be directed to getting the most perfect image possible of the principal objects, without any consideration for those which occupy a less prominent position. Thus, while we have the most perfect definition in the foreground of his pictures, the background appears dim and indistinct to an extent which cannot be attributed to the natural effect of distance. This defect does not exist in the whole of his pictures, for we find an exception in the immediate vicinity of those we have just noticed. It is a "View near Chagford," and is a very superior photograph. The details are exceedingly well rendered, and the appearance of the water is excellent. There are three or four others by the same artist, which, though possessing great merit, are none of them equal to that just noticed.

94 is a copy of an engraving after Raphael, by Roger Fenton. It represents the Virgin and Child standing on a cloud, with figures below in different attitudes of adoration. The copy is an excellent one; the figures stand out boldly, and the minutest details of the drapery are beautifully rendered. The only defect is in the eyes of the two principal figures; they have much the appearance of large black dots.

"Le Pas de l'Echelle" is an interesting picture on account of the scene it depicts, but in execution it is not equal to what we should have expected from Mr. Lyte; neither is the view of the "Pont de Houral," although it is certainly better than the preceding, and some portions of it are exceedingly good, and much superior to other parts of the same print. A portrait exhibited by M. Garnier is a very good specimen of what may be accomplished with the aid of Mr. Moule's photogen. There are a great many views of different portions of the Isle of Wight, some of which are very good, and among them is one by R. Gordon of a scene in Shanklin, which, though it possesses no very striking features, is yet a very nice, clear, sharp print. Mr. Baynham Jones puts the merits of the calotype process to the test in the attempt to give a view of Black Gang Chine. As a picture it is not very interesting, from the inability of the photographer to include the whole of the Chine in the print; but we should have been glad to have examined it more closely than we were able to do, at the height at which it was hung, on account of the process by which it was taken.

The Exhibition is largely indebted to Mr. Fenton, both as regards the number and attractiveness of the prints he sends. Their beauty and large dimensions render them the most prominent feature of the Exhibition, and it is at the part of the wall on which they are suspended in close proximity that the visitors linger longest, more especially as there are among them many of Henry White's pictures, which, with their own peculiar attractions, differ so widely from those by Fenton. We will take those we have had time to examine, by the latter artist, and review them in detail before we deal with Mr. White's. First, we have a copy of one of Lance's fruit pieces, which, though very good as a copy, is not attractive as a picture, from the absence of colour, which constitutes the sole beauty of such paintings. "A Fresh on the Hodder" is a beautiful representation of a most lovely spot. The foliage stands out in masses, and the appearance of the water is unusually good. Far inferior to this, both in the choice of subject and in the manner in which it is rendered, is a view "In the Cloisters, New College, Oxford." The "Lily House" in the Botanic Garden is much better; the details are more distinct, and, considering the difficulty of the subject, the print may be pronounced a successful one. The entrance to this garden forms the subject of another print, which is one of great merit. Every detail of the architecture is rendered with great clearness, and the whole forms a very pretty picture. In the "Dark Walk," at Stonyhurst, we have a highly interesting photograph, which differs widely from the others exhibited by Mr. Fenton. The subject is a long avenue of fine trees, the branches of which interlace each other in such a manner that the walk beneath must be obscure, even on the brightest day. The picture was taken at a happy moment; we see the bright rays of sunshine which penetrate the intervals between the trunks of the trees forming one side of the avenue resting on the gravelled path, and forming by their brightness a delightful contrast to the shadow in which the trees on the opposite side are involved. The variations of light and shade are exquisite, and the manner in which they are rendered does the highest credit to the photographer. The print which hangs next to this, "Boys in the Refectory," by the same artist, seems to have been placed there as an encouragement to beginners, by showing that even the artist who can produce a picture like the "Dark Walk," can also produce one not surpassing their young efforts. The catalogue says they are boys, and their dress bears out the statement; but we have no evidence of the fact, for hardly one of them has got even the faintest outline of a face. Evidently, it is in out-of-door subjects that Mr. Fenton excels. He possesses an eye for the picturesque, and his choice of the point of view from which to take the picture is usually excellent. We have an example of this in his view of the "Salmon Pool," at the Sade Wheel, on the Ribble. The scene is a charming one, and the beautiful sheet of water is rendered in a manner seldom equalled. A contrast to this is offered in the "View from Lancashire into Yorkshire," which is a beautiful picture of hill and dale—the effect being heightened by the river Hodder, which runs through the centre. The river scene, in contact with this, is not so good; it represents the "Reed Deep," on the Ribble; and, though the subject is well chosen, it is but indifferently rendered—the foliage especially being indistinct, no doubt owing to the motion of the leaves from the wind blowing at the time. The dissatisfaction we feel with this print is, however, amply compensated by the beauties of

that immediately below it. This view is termed the "Mill at Hurst Green," and the subject is so well chosen, has such a picturesque appearance, and, on the whole, is so beautifully rendered, that it would seem hypercritical to mention its trifling defects. In the view at "Ribbleside" we have a pretty picture, in which the principal feature is a group of gamekeepers and fishermen, so naturally posed, that Mr. Robinson would do well to take a lesson from it the next time he introduces figures into a photograph. He may see, in this, how effective figures may be made when properly grouped, and made subordinate to the general effect of the picture. We are shown the result of their sport in another print; but the representation is hardly so interesting to the spectator as the possession of such a basket of trout must have been to the owners. Everything has been sacrificed to the desire to obtain a good image of the fish, and, after all, with a result which is not very gratifying. 136 is another view of the "Hodder from the New Bridge," but, though a fine print, it is not without defects. The representation of the water in the foreground is excellent, but the background is less distinct than it ought to be. The view of "Hodder Old Bridge" is a finer picture, but the effect is, to a slight extent, marred, by the stones in the bed of the river being indistinct, apparently from their being out of focus. The same defect is observable in the view of "Cottages at Hurst Green," a great portion of which is more or less deficient in sharpness, while a group of children in the centre of the picture have the appearance of being enveloped in a fog. His view of "Paradise" is not so beautiful as to induce any inordinate desire in the mind of the spectator to go there. The water is not so well represented; and, with the exception of the objects in the foreground, there is a want of clearness in the picture. He has been more successful in a view which bears the less pretentious title of "A View down the Hodder." The trees and water are more successfully depicted, and the pieces of rock in the bed of the river exhibit the most delicate gradation of tone. 151, "A Pool on the Ribble, near Ribchester," is a misnomer; there is no pool at all, and the narrow strip of water which occupies the foreground is not at all attractive. The shadows of the trees reflected in it are so black as to overpower the representation of the trees themselves; the masses of foliage are beautifully rendered, and it is a real pleasure to look at the pictures of such magnificent trees. There are several other photographs exhibited by the same artist, but we have not space to notice more than one of them. This is a view of the "Sodality Chapel," or, strictly speaking, of the "Chapel at Stonyhurst," and is one of the most beautifully-rendered pictures of an interior we ever met with. There is a considerable amount of architectural decoration, yet it is depicted with the most minute accuracy, and with the most beautiful effects of light and shade.

Scattered about among the prints described above are some almost equal in dimensions, but strikingly different in their appearance; these are by Henry White. The tone is peculiar but agreeable, and admirably suited to the subjects represented; but they have serious defects. As a general rule, they are wanting in sharpness; and, though portions of most of them are beautifully rendered, the picture, as a whole, is seriously impaired by this defect. In spite of this, however, there is something in them which attracts the eye. The point of view from which they are taken has been judiciously selected, and the subjects are, for the most part, attractive. Their merits and defects will be better seen as we review the principal of them in succession. The first print we meet with is a view of "Chobham Common," which presents the defect of indistinctness in a great degree, and we turn our attention to that adjoining it—"A Harvest Scene." This is a much better picture in some respects. The trees which occupy the background are finely rendered, and the same may be said of other portions; but the wheat, which fills the most conspicuous position, is a comparative failure; there is an abundance of straw, but no ears, and the place where the ears ought to be is indicated by a foggy appearance, which it pains the eye to look at. "A River Scene" would have made a beautiful picture if it had been well taken; unfortunately, it was not. Every object which was movable is hazily depicted, or else is wholly undistinguishable. This may have been caused by a wind blowing at the time; but this is no excuse, as every photographer is aware of the consequence of taking a negative under such circumstances. The picture by the same artist hanging next to this, is very much better. It represents a group of Scotch firs, which are beautifully rendered, and form a perfect study. This picture would be invaluable to a painter who wished to depict such a scene on canvas or in water colours. "Ottershaw Homestead" is a nice clear print, but it does not show much of the homestead, and possesses no particular interest. The "Road up to the Common" presents the defect we have mentioned as evident in most of this artist's prints—it is dim and deficient in sharpness. The same may be said of the "Heath and Plantation," as far as regards the foreground. The whole of his attention appears to have been directed to getting a good image of the fir trees, and, certainly, in this respect, he has succeeded admirably. At a short distance this picture has a beautiful appearance; but, in our opinion, the most perfect print, taken altogether, which he exhibits, is a view of "A Wheat-field." The scene is a very pretty one. The sheaves of wheat are very fairly represented; and the heavy masses of feathery foliage of the fir trees are admirably rendered. The picture is a highly attractive one, and is worthy of the artist.

POSITIVE PRINTING.

With reference to the article on this subject in your number for January 6, page 205, I beg to state that the directions there given were not put forth on my own authority, as "θ" seems to suppose, but on that of the different authors of the systems I had endeavoured "to compare and consolidate." Where I found they differed, I had of course to exercise my own judgment in selecting that mode of manipulation which appeared the best; but the whole was professedly a compilation made for my own use, and intended as a *resumé* of all I could find in the different journals on the subject. In printing last summer and autumn by the new methods, I saw they differed so little in principle, that they might be easily as well as advantageously amalgamated, and I therefore adopted the plan described in the directions I have given. I should, however, state, that I have had no experience in preparing albumenised paper, but having frequently seen the prints turn red in the hypo. bath, and read complaints of the same thing in another publication, the editor of which stated that this annoyance might be obviated by adding more salt to the albumen, I copied his directions, with the intention in future of either preparing the albumenised paper myself, or getting it done by his formula. I readily concede that 10 grains of salt to the ounce, which I believe is the quantity usually employed, were sufficient under the old system; but in printing by the new methods, I am strongly of opinion that 15 or 16 grains to the ounce are preferable. Mr. Maxwell Lyte, whose authority every photographer will respect, thinks 3 per cent. of salt, or about 14 grains, the minimum that should be used, and states that he himself employs 4 per cent., or about 18 grains, to the fluid ounce of albumen bath. As to the addition of acetic acid to the albumen, I must say that, although I gave the formula as I found it, I much doubted at the time the advisability of employing that ingredient, and, after the opinions of "θ" and Mr. Maxwell Lyte on the subject, I quite agree that it should be omitted.

"θ" remarks that, with 15 grains of salt in the albumen, the strength of the nitrate bath should be 75 grains. It was this consideration which led me to adopt the recommendation of Mr. Melhuish, supported as it was by the sanction of Mr. Sutton. On such a bath, the paper should not be floated longer than two minutes, the time I have directed,

the object being to prevent the liquid sinking into the paper. With this view, a 75-grain bath will always be preferable to one of 60 grains.

As to the quantity of water to be used for washing the free nitrate from the proof, it is obvious that if the free nitrate is to be saved, the less water employed the better. The operator will exercise his own judgment as to this, and likewise as to whether he will immerse the print, before toning, in a water bath containing salt or ammonia. Either method may be pursued, and it matters little which. Mr. Maxwell Lyte directs the use of salt, and, in following his advice, I must say, I never perceived the "slight film" on the surface of the paper which "Θ" speaks of, nor have I ever heard that objection before. The reason which determined me in favour of salt and water was the one I stated, viz., that the print may be removed at once to the toning bath, without the necessity of washing it, a little salt in the toning bath operating rather beneficially than otherwise; whereas, when ammonia is used, a thorough washing is indispensable before the print can be safely placed in the gold solution. Thus one washing is got rid of—a potential reason with most photographers—who may, if they please, discard both methods, provided they will take the trouble, after saving the free nitrate, to give the print a thorough washing under a tap.

I now come to the last and principal point of disagreement between "Θ" and myself—the employment of carbonate of soda in the toning bath in the quantity used by him, *i.e.*, from 20 to 30 grains to the ounce of bath. This I objected to, as "wrong in theory, and injurious in practice," and I am still of the same opinion. The auro-chloride of sodium is the real toning agent, and the extemporaneous mode of preparing it I gave for the convenience of amateurs. I am glad to see, however, that, owing to the increasing demand for it, it is now prepared by photographic chemists, and may be purchased ready for use. The auro-chloride being indispensably necessary, and containing, as it does, the proper amount of carbonate of soda, let me ask "Θ" what object he proposes to attain by adding more soda to the bath? Let it be remembered, that an excess of carbonate of soda is wholly inert in the bath, as regards the process of toning; that it neither accelerates nor retards the operation; while, by acting on the surface of the paper, it more or less dissolves that portion of the albumen most exposed to its influence, and renders the high lights of the picture too white, destroying the harmony which should exist between them and the rest of the picture; in fact, the whole of the albumen is frequently removed from the whites of the print, leaving nothing but the bare surface of the paper visible. With an excess of 20 to 30 grains of carbonate of soda to the ounce of bath, I have so frequently witnessed these abominable results, that I must protest against the agent which produces them. It is just as bad taste to make the whites of a picture too white, as it is to paint out the skies in landscape negatives; and, although photographers are to be found who do both, we are not to be converted to their wretched and vitiated tastes—our own having been formed in a higher school of art than that of which they have any cognisance. The eulogium passed on his own prints by "Θ" may be well merited, but I must confess I should be curious to inspect some of them, to ascertain whether they realise my own standard of excellence, or exhibit the defects to which I have alluded. These defects may be prevented by preparing the toning bath by the formula of Mr. Maxwell Lyte—that is, by adding from 15 to 20 grains of phosphate of soda to each ounce of bath, as recommended by me. "Θ" does not advance a single reason for employing a large excess of carbonate of soda, but only says "he doubts" whether it dissolves the size of the paper. The opinion of certain of the French chemists, cited by him, has reference to the fixing, and not to the toning of the print; and, even were it to the purpose, we all know how very wrong the French have been in their photographic chemistry—so much so, indeed, that no reliance can be placed on their conclusions. Mr. Maxwell Lyte, who has for some years resided in France, and who has so long been known as a most indefatigable and well-informed photographer, so far from coinciding with the French chemists on this point, is directly at issue with them, and comes to my assistance in a way which leaves me nothing to add. I will, however, gladly embrace this opportunity of thanking him for the admirable toning bath he has given us, as well as for the many obligations we are under to him as a pioneer in the difficult and unexplored regions of photography. It must be a source of great satisfaction for him to know that his labours are appreciated, and that his method of printing has been adopted by many of our foremost photographers, and I have little doubt that "Θ" himself will eventually be reckoned among the number of those who praise and practise it. R.

GENERAL OBSERVATIONS ON PHOTOGRAPHIC POSITIVES.*

BY MESSRS. DAVANNE AND GIRARD.

OF FIXING—(*continued*).

The experiments we have undertaken on this subject clearly establish, that a hyposulphite solution becomes hurtful to the permanency of the proof much more rapidly than has been hitherto supposed; and that, after the fixing of a very small number of proofs, it is really capable of fixing a great number of others, but then the fixing is necessarily bad, and leads to the alteration of the image. A few facts will enable us to comprehend this. When a solution of hyposulphite of soda (and, to facilitate the argument, we will fix a determined strength for this—10 per cent., for example) has served to fix a proof, and has carried off the salts of silver not attacked by the light, it constitutes a solution, not of chloride or nitrate of silver in hyposulphite of soda, but double hyposulphite of soda and of silver in this same vehicle. Now, direct experiment demonstrates, that the real saturation of the hyposulphite of soda by means of this double salt is very rapidly attained: thus, by placing in contact a solution of hyposulphite of soda, at 10 per cent., and a great excess of recently-precipitated chloride of silver, filtering, and then leaving the liquid to settle, it will be perceived that, at the end of no very long time, a large proportion of the double salt is deposited in a very pure, white, crystalline state. If we then seek to determine the strength of this liquor, which does not alter in the air, and which must be considered as corresponding to the saturation of the hyposulphite by the double salt, we recognise, with astonishment, that this solution, at a temperature of 60°, does not contain more than about 32 grains of silver to the quart, which corresponds to a little more than 2 parts of chloride of silver to 100 of new hyposulphite. Now we know that a large sheet of paper contains, after sensitising, 1·82 grammes (15¼ grains) of chloride of silver alone; therefore, when about a sheet and a half have been passed (the paper having been freed from its nitrate by washing in water) in a bath containing a quart of hyposulphite solution, at 10 per cent., the bath will be saturated with double salt.

It does not follow from this that the bath will be henceforward incapable of dissolving a fresh quantity of nitrate or chloride of silver; far from that—it will still be able to dissolve considerable quantities, and it is precisely in that the danger lies. In fact—as the crystallisation obtained in the preceding experiment indicates, and as will be shown still better by some essays which we are about to relate—the hyposulphite solution can dissolve much more chloride and nitrate of silver. It may fix numerous proofs; but from this moment it is sursaturated with double salt, it is in an unstable condition, and tends to return to the preceding stable condition—a tendency which is manifested by a slow but constant decomposition. To enter into details:—

If we take one quart of a solution of hyposulphite of soda, at 10 per cent., and shake up in it 32 grains of freshly-

* Continued from vol. iii. p. 245.

precipitated chloride of silver, this chloride will dissolve, and we have the normally unalterable saturated solution of which we spoke just now. If we add to this saturated solution a second, and then a third, quantity of chloride of silver, and so forth, the chloride will dissolve, but the solution will become unstable, and will soon begin to deposit, not the double white salt, but free hyposulphite of silver, which will be instantaneously decomposed. This deposit will be slow to produce itself in a complete manner, but it will be, therefore, only the more dangerous to the photographer on that account.

The same thing will happen if, instead of adding chloride of silver to the hyposulphite, at 10 per cent., nitrate of silver is added. In the first place, and if the quantity of nitrate is feeble, the hyposulphite of silver, formed by precipitation, dissolves, and the liquor will deposit crystals of double salt; if, after this, nitrate be added, the liquid will dissolve it in large quantities, which may reach the point of close upon two ounces to the quart of solution. The liquor will then have greatly exceeded the point of saturation indicated; it will also be extremely unstable. This point reached, it will be decomposed with very great rapidity, depositing, not double salt, but hyposulphite of silver, which, agreeably to the re-actions indicated in the formulæ (*a*) and (*b*), will give sulphur and sulphate of silver. After twenty-four hours a very abundant precipitate will be formed, and the supernatant liquor will contain no more than an ounce of the nitrate of silver to rather more than a quart; and this quantity will diminish every day, until, at last, it falls to the point of saturation indicated above.

Let us now seek the explanation of these facts; it is easy. The double salt (AgO,S_2O_2), $2\,(NaO,S_2O_2)$ is dissolved to saturation in the hyposulphite of soda; we add, in the first place, a small quantity of chloride or nitrate of silver; these, more soluble in the hyposulphite than the double salt, dissolve; they then form a new quantity of double salt, and this is precipitated in a white condition, since nothing can dissolve it; we afterwards add a fresh quantity of one or the other bodies, this reacts on the double salt, which is precipitated, or which is itself precipitated by a slow action, and decomposes it; a fact easy to demonstrate, for experiment has shown us, that by taking pure and white crystals of double salt, it suffices to add to them an excess of soluble salt of silver, for a decomposition to take place sometimes slow, sometimes rapid, according to circumstances, and is manifested by a deposit of hyposulphite, as is indicated by the formula—

$$(c)\quad (S_2O_2,NaO)_2\,(S_2O_2,AgO)+2AgO\ NO_5= (S_2O_2AgO)_3+2NaO\ NO_5,$$

the hyposulphite of silver, moreover, decomposing after the formulæ (*a*) and (*b*).

(*To be continued.*)

COLLODION FOR THE DRY PROCESSES.*

BY T. F. HARDWICH, ESQ.

As the question of colour and intensity of image is of importance, I shall not leave it without making a few more remarks. Why would the fact of the iodide of silver resting merely upon the surface of the film in the case of the powdery collodion be calculated to lessen the density? Probably, because the pyroxyline made in the way which I recommend is not altogether inert to the salts of silver, but has somewhat of that action which we find possessed by albumen and many other organic bodies, of increasing the intensity of the developed image. This position I am quite able to maintain: and if we allow it to be true, it suggests the importance of having the iodide *in* the film as well as upon the surface.

We now pass on to consider the effect of keeping the collodion for a time in the iodised state before using it, and I may mention, that in the experiments a portion of *bromide* was associated with the iodide, not only because it has a more decided action in carrying down organic matter and fixing it upon the film, but also because the use of bromide in the dry processes does not retard the development or make the image metallic, as it does in the wet. The bromide and iodide of ammonium and cadmium, in the proportions used for positive collodion, form a mixture very proper for the purpose.

The horny collodion newly iodised is extremely sensitive in Fothergill's process, but the image develops somewhat feebly, and with a long-focus lens in a subdued light there would be a want of contrast. This condition of collodion does not allow of too much washing before the albumen is laid on; otherwise the above-mentioned defects increase and the development becomes difficult to manage. Old iodised collodion differs in this respect from new—there is more decision and contrast in the picture; and, supposing the preparation to be in a certain state, the plate may be washed rather freely with water previous to the application of the albumen, without interfering much with the intensity. This, therefore, is the point to which my attention was directed.

Whatever be the exact nature of the change which takes place in collodion after iodising with the alkaline iodides, we cannot doubt that in its essential features it consists in the pyroxyline displacing a portion of the base, and in some manner neutralising it. We therefore strive to imitate this change by adding a portion of free alkali to the collodion; and, as far as my own observations extend, the effect of all the alkalies and alkaline carbonates is nearly the same, photographically speaking. If there be a difference, it is rather in point of time and in rapidity of action than in any more essential particular.

Taking a sample of the horny collodion made as before described, I add to each six drachms two drachms of absolute alcohol, in which has been dissolved a quarter of a grain of pure potash free from carbonate. The liquid immediately becomes ropy, and, with a less proportion of alcohol, semi-gelatinous. In a very short time, however, the ropiness goes off, and the collodion is then rather more limpid than previously to the use of the potash. At this stage, a few drops of an alcoholic solution of nitrate of silver, added to a small portion of the collodion in a test-tube, produce a *white* turbidity. If the cloudiness should be white at first, but afterwards assume an olive-brown tint, a portion of the potash still remains in the collodion in a free state. Perhaps the safer plan will be to allow the action to continue for twenty-four hours, after which the precipitate produced with nitrate of silver will be quite white, and it then remains only to dissolve in each ounce five grains of iodide of cadmium and one grain of bromide of ammonium. If these proportions should produce *a blue film*—to which there is always a tendency in collodion having undergone decomposition—they may be increased.

The photographic properties of collodion modified in this way are very remarkable, and, on making trial of it in the dry processes, we see at once that an important change has been produced. The tendency to active development is so strong in Fothergill's process, that it matters very little in this respect how far the washing is carried before putting on the albumen; for, even if the free nitrate of silver be fully removed by copious treatment with distilled water, there is no difficulty in obtaining a dense picture. In the oxymel process, the plates develop with a bloom and ruby red colour, like wet collodion, and are in danger of running into red solarisation. I notice also a clearness and brilliancy in the image, such as usually accompanies a state of film giving intense development; the action of the reducing agent seems so strongly determined towards those parts of the film which have been touched by light that it expends itself, and hence the shadows are preserved in a state of transparency.

There is one objection to the use of alkali in the manner now advised, viz., that the collodion is rendered very tender.

* Continued from vol. iii. p. 244.

The state produced cannot properly be called *powdery*—a more correct term would be *rotten*. If ammonium compounds are afterwards used in iodising, the film, already weakened as far as it will bear, sometimes gives way, whilst, if cadmium salts are substituted, the adhesion to the glass is lessened, and the collodion wrinkles during development. This tendency may be overcome by applying a preliminary coating to the glass, after which the working of the collodion is everything that could be desired. Those who are conversant with the peculiarities of the different kinds of collodion employed in the wet process, will readily understand that the state of film now under discussion sometimes fails in rendering the half tones, and that a hard quality of picture may be produced, unless the proper conditions are understood.

(*To be continued.*)

GOLD PRINTING PROCESS.

The following was addressed to the French Photographic Society by the Duke de Luynes:—

The experiments which I am about to relate were first suggested to me by those of M. Poitevin, communicated in May last. We see there that the author, observing and profiting by the deoxidising properties of light on certain salts, has specially employed perchloride of iron, associated with nitrate of uranium, as a photographic agent. Having exposed a paper impregnated with these two solutions under a positive, M. Poitevin says the parts acted upon by the luminous rays become white on a yellow ground. Then, using gallic or pyrogallic acid to develop the image, he obtained a positive proof like that under which it was exposed, the gallic acid not being combined with the iron, except in the points where, protected against the action of light, it had remained in the condition of a salt of peroxide.

On reading this paper, it was easy for me to conclude that if the perchloride of iron with which a paper is imbued passes to the condition of a protochloride, in all the parts exposed to the sun, an entirely opposite result to that obtained by M. Poitevin ought to be produced by substituting for the gallic acid a substance so easily reducible by the proto-salts as chloride of gold. A paper floated on this bath was dried before the fire, and exposed to sunshine under a negative. At the end of an hour the positive was completely apparent in brown on a yellow ground. Placed in water acidulated with hydrochloric acid, it was readily washed, and confirmed, in a very conclusive manner, the theory enounced by M. Poitevin.

To verify this in a still more simple manner and with greater certainty, I exposed a paper which had been steeped in perchloride of iron alone to sunshine under a negative. At the end of an hour I examined the proof. On this, all the shadows were white on a yellow ground. Passed in the chloride of gold bath, this image underwent an immediate and complete transformation. The parts acted upon by the light suddenly assumed a brown colour, and the positive proof appeared. Afterwards washed in water acidulated with hydrochloric acid, it showed itself just as I expected, but sensibly less vigorous than that in which the perchloride of gold and the perchloride of iron had been mixed in the paper bath.

The positive prints obtained by a mixture of the perchlorides of gold and iron offer a peculiar reaction, which may be easily accounted for by the more or less complete reduction of the salts of gold. All the parts on which the sun has had but little action, as the half-tones, horizons, &c., are bluish; those on which the sun has exercised its full influence—that is to say, the deepest shadows—are brown, the colour of finely-divided gold. This reduction of gold in the shadows prevents them from attaining very great intensity. I attempted to guard against this defect by associating perchloride of platinum with that of iron, exposing the paper steeped in this mixture of the two salts under a negative, and afterwards passing it on the chloride of gold. This process was empirical, since it is not believed that the proto-salts of iron reduce the perchloride of platinum. Nevertheless, it gave me an almost unhoped-for result. After having undergone the solar action, the prints, like those obtained by perchloride of iron alone, showed the shadows in white on a yellow ground, but being transferred to the chloride of gold bath, the image appeared of a very vigorous iron grey and black colour. A bluish or brown reduction, according to the intensity of the light transmitted through the negative, cannot be perceived in these, as in those obtained with the perchlorides of gold and iron; they present every gradation of tone, but no variations of colour.

To try something else more in accordance with the acquired information, I afterwards made use of pernitrate of uranium, mixed with perchloride of gold. I hoped in this way to obtain results different from those produced by the perchloride of iron. In fact, after a sufficient exposure to the sunlight under this negative, the paper, steeped in the mixture of these two salts, was passed in a chloride of gold bath, and gave a positive image of an agreeable sepia tone, slightly modified. I washed some of these proofs in which uranium had been used in plain water; others, in water acidulated with hydrochloric acid; the tones in both cases were pretty much the same.

One general observation applies to all the above-mentioned essays. The images penetrate the paper, and are only beautiful by transparency—at least, not unless the varnish used by photographers for small portraits is applied on it; in which case, the entire picture is as distinct by reflected as by transmitted light.

This inconvenience may be avoided by using gelatinised papers; but the exposure required in this case will be at least twice as long, and the reduction of the salt of gold will be sufficiently complete to render the metal apparent in its own colour in the shadows, and rose-coloured in the half-tones.

To spare amateurs who may desire to repeat these experiments the tedious researches which I was forced to make myself, I give the processes which appear to me to be the best:—

1. Photographic paper, floated on one side only, on a bath composed of perchloride of iron at 10 degrees of the acid hydrometer, and perchloride of gold at 10 degrees; mixed in equal volumes; dried in the dark room, and the drying completed by exposing it to the heat of a fire. Expose to sunlight under a negative for three quarters of an hour or an hour, according to the intensity of the light. The image appears of a brown hue. Wash in water acidulated with hydrochloric acid, and finally in common water.

2. Photographic paper, floated on one side only for a few minutes, on a bath of perchloride of platinum at 10 degrees, and perchloride of iron at 9 degrees, of the acid hydrometer; mixed in equal volumes; dried as above. Exposure from two to three hours. The image is rendered in white on a yellow ground. The sheet is then floated on a chloride of gold bath, at 5 or 6 degrees. The image appears immediately black. Wash first in water acidulated with hydrochloric acid, and afterwards in common water.

3. Photographic paper floated on one side only, on a bath of crystallised nitrate of uranium, dissolved in twice its weight of water, and chloride of gold at 10 degrees, mixed in equal volumes; left to dry in darkness for an hour, and the drying completed at the fire. Expose to the sun for about an hour and a half. The image shows itself of a brown colour on a yellow ground; but on washing the proof in pure water, or in water acidulated with hydrochloric acid, it assumes a sepia tint.

PHOTOGRAPHY AND CRIME.

Science, when duly invoked, is capable of affording valuable aid to the officers of justice in pursuit of a criminal. The electric telegraph has often been successfully employed in intercepting the flight of the murderer or absconding

felon, and the railway affords the means whereby the detective policeman can hurry from place to place and follow the traces of the flying criminal, as long as such traces exist. So photography is capable of affording powerful aid in the detection of criminals who have successfully evaded all other expedients. Some six years ago, Mr. Gardiner, the zealous and intelligent governor of the Bristol gaol, having provided himself with the necessary apparatus for taking photographic portraits, subjected such of his prisoners as were thought to be veterans in crime to the collodion process, and copies of their portraits being distributed among the police of our large towns, several instances of identification occurred, whereby prior convictions were produced at the trials against prisoners whose history had been thus disclosed, and opportunity was given for administering a punishment more adequate to their deserts than could have been inflicted had they been sentenced on what—but for these discoveries—would have appeared to be their first conviction. Mr. Gardiner hastened to communicate to the Home Office his success in making Photography the handmaid of Justice, but no steps have yet been taken by the Executive Government to bring this novel detective into general employment. Mr. Gardiner, however, not discouraged, still perseveres. One of the photographs from his "Rogues' Gallery" being sent from Bristol to Birmingham, enabled one of the police-sergeants to recognise the original as a hardened offender, who had led a life of crime in Birmingham and elsewhere, and had been more than once convicted. That the identification was due to the photograph, and to that alone, was proved by the following circumstance:—A well-written and minute description of his person and dress, and also of his companion, had been published in the *Hue and Cry Gazette*, which circulates throughout the police of the kingdom, but without effect. The sergeant attended at the trial which took place at a quarter sessions for Bristol, and proved against the prisoner one of his prior convictions; whereupon the Recorder sentenced him to six years' penal servitude.

A photographic apparatus ought to be at the command of the heads of the police in every town, so that, upon the apprehension of an offender, his "counterfeit presentment" might be dispatched for recognition to the principal police stations throughout the country. Here is a profitable sphere of operations for photographers, worthy of being looked after, especially by those who are desirous of forming a Rogues' Gallery. We have no doubt that the practice of making every member of the dangerous classes "sit," would result in helping materially to forward the ends of justice; while the gallery itself would afford a rich field of study for the anthropologist.

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

HOW TO MAKE A SET BACKGROUND.

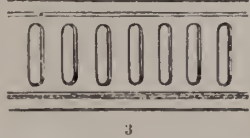
1. A vase, cut out of a piece of thick mill-board.

2. A pedestal, made by straining a piece of holland on a thin deal frame, and putting on the top and bottom moulding with a piece of mill-board, shadowed and cut out to the form.

3. A frame covered with a piece of holland, and then another piece glued or pasted on the first one; when dry, cut out the openings or perforated work with a sharp knife.


1

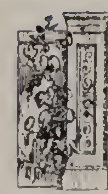

2


3

4. A tree, formed by cutting out the shape in mill-board, and pasting on an upright stem.

5. A wall and pilaster piece, with vase on top; when all the pieces are put together in their proper positions, they form the picturesque set.


4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6. The plain wall can be used at back, or a landscape distance introduced, according to the fancy of the operator.


6

Having a set in various pieces will enable the photographer to shift and turn them about in many different ways, and form a variety of backgrounds—narrow or wide—by very simple means.

THE FITZMAURICE LIGHT.

Photographers have been greatly interested in a new description of artificial light of unprecedented power and brilliancy, known as the "Fitzmaurice Light," the invention of a gentleman of that name. Curiosity, although greatly excited on the subject, has hitherto found no gratification, but at length the prospectus of "The Fitzmaurice Light and Portable Gas Company" is issued, and we are now

enabled to gather further information of what promises to be a great boon to the art of photography.

The Light is patented, but at present we are not informed in what manner it is produced, nor from what materials, although sufficient information may be gathered from the prospectus to enable us to infer the source from whence it is obtained. It is asserted that these lights will prove superior to every other hitherto invented. They can be used in two modes, either compound as a grand oxy-olefiant light, with immense power for sea or land, or singly, as a surpassingly brilliant domestic gas-light, for all ordinary purposes.

The domestic light offers a desideratum in household economy such as no other light can supply. It is a cool white light, by which the most delicate shades of colour can be distinguished, and as such must recommend itself to the photographer. Its manufacture is perfectly simple, and may be carried on in the closest proximity to private dwellings without the risk of any kind of nuisance: the gases, by means of a small, simple, and inexpensive apparatus, may be manufactured by any individual. These lights, of surpassing brilliancy and purity, offer at the same time the invaluable advantage of freedom from oppressive smell, heat, and smoke, and the evolution of sulphurous vapour—objections which greatly militate against the use of coal-gas. The mode of employing these gases is so simple, and so completely under control, that all risk of explosion is prevented. They burn steadily and continuously, at a cost of one farthing per hour for the domestic light, and of one penny per hour for the grand light; ordinary gas-fittings and fixtures are available for their use. The portability of the gas is such that it can be compressed into and used in movable table lamps, and may be sent, in proper vessels, from one place to another. The apparatus for making it is also portable. It is asserted that the grand light, placed at a sufficient elevation, may be seen from a distance of ninety miles.

The quality of the light is described as sun-like, the minutest objects, the most delicate colours and their hues, being readily distinguishable, and it has been proved by successful experiments to be eminently adapted to the science of photography.

Such are the statements and promises set forth in the Company's prospectus, and if they be in any reasonable degree verified, the photographer gains an ally that will enable him to defy fog, and turn night into day. It is to be hoped that it will be speedily introduced to the notice of the disciples of our art at an early meeting of the Photographic Society.

Dictionary of Photography.

Iodide of Silver is composed of one equivalent of iodine and of one equivalent of silver. It is yellow, completely insoluble in water, and blackens when exposed to the light, but much more slowly than chloride of silver.

Iodide of silver when exposed to the luminous rays blackens under the influence of energetic reducing agents, such as gallic and pyrogallic acids, sulphate of protoxide of iron, mixed with nitrate of silver, &c. Photography largely avails itself of this property in preparing negatives. Iodide of silver is formed, in obedience to the law of double decomposition, whenever any soluble iodide is placed in contact with nitrate of silver.

To obtain a layer of iodide of silver, it is sufficient to incorporate a soluble iodide in a substance insoluble in, but permeable by water, such as paper, coagulated albumen and collodion, then to pass this preparation into a bath of nitrate of silver; decomposition takes place immediately, the iodide of silver formed is retained by the paper, collodion, &c., and a sensitive surface is produced.

Iodide of silver is soluble in an excess of iodide of potassium, and in an excess of nitrate of silver; its solubility in each of these substances increases with the strength of their solutions; so that, when they are diluted with water, the iodide of silver is precipitated in the form of a fine primrose-yellow powder. In presence of iodide of potassium this salt is insensible to light, but, on the other hand, it is much more sensible in presence of an excess of nitrate of silver; it, however, becomes sensible if the iodide of potassium is removed by prolonged washings.

Iodine.—One of the metalloids which, both in a free state, and in combination with other bodies, plays a very important part in photographic processes. Iodine is a solid body, presenting the appearance of irregular metallic scales, of an iron grey or leaden hue and lustre. It was first discovered in 1812, by Courtois, in the kelp from which he obtained carbonate of soda; its properties were investigated by Gay Lussac, Clement, and Davy. It is found, but in very minute quantity, in sea water; it is obtained chiefly by icinerating certain fuci and other marine plants, and is found also in sponge, the ashes of which contain iodide of sodium. It is known, also, to exist in combination with silver, zinc, &c., in certain mineral ores. Iodine is volatilised by heat, dissipating in dense violet vapours (hence its name). It fuses at 224·6, and solidifies again, in a crystalline form, on cooling. Its odour resembles chlorine; it stains the skin, paper, and other organic bodies, of a brownish red colour, which gradually disappears, if not too long in contact, in which case the organic body is decomposed by the iodine. It is almost insoluble in water, one part requiring 7,000 times as much of the latter to dissolve it; in alcohol and ether it is much more soluble, and also in chloroform and in sulphide of carbon; these solutions are of a deep violet colour. The specific gravity of iodine is 4·948; its equivalent is 126. It is an irritant poison. The distinctive character of free iodine is that of imparting a blue colour to starch; this colour disappears when the solution is heated to 176° Fahrenheit, and reappears upon cooling. Most French papers are sized with starch, and consequently assume a blue colour when immersed in solutions containing free iodine; but if the iodine be in the state of iodide, and the paper contains no chlorine, the colour, which is now violet rather than blue, frequently appears only after exposure to the air. Pure iodine is used in the daguerreotype process. The silvered plate, after being exposed to its vapour, assumes a yellow tint, indicative of the formation of iodide of silver—a compound exceedingly sensitive to the chemical action of light. When paper, sized with starch, is prepared in a solution of pure iodine, and then passed into a bath of aceto-nitrate of silver until the blue colour has entirely disappeared, the paper acquires sufficient sensibility to furnish very good proofs. The vapour of iodine diffuses itself over the black lines of an engraving without touching the white spaces, so that the design may be reproduced on paper prepared with starch, or on a glass covered with it, and thus form a design, the coloured parts of which will be iodide of starch. These designs are, however, not permanent, but may be made so by plunging the design thus obtained into a solution of nitrate of silver, until it disappears; but, on exposing the paper or glass for some seconds to the light, the original design of iodide of starch is changed into iodide of silver; and, by further exposure to the light, this iodide, being much more sensitive than the nitrate of silver contained in the paper, or in the layer of starch on the glass, it is acted on before the nitrate; it is then only necessary to plunge the glass or paper into a solution of gallic acid to bring out the original design, which is then treated with hyposulphite of soda, as for photographic pictures, and thus rendered permanent. This is M. Nièpce de St. Victor's process. M. Bayard proceeds as follows:—After exposing the engraving to the vapour of iodine, he applies it to glass, prepared with sensitised albumen, in order to produce a negative, and, with this, he obtains paper positives in the usual manner. He has thus made magnificent copies of very old engravings, without defacing in any way the originals.

Iodine is generally employed in photography in combi-

nation, in order to obtain iodide of silver by double decomposition, as with the iodides of potassium, cadmium, &c.

Iron.—A simple metallic body, too well known to require description. Many of its compounds are used in photography, such as the iodide, ammonio-citrate, sulphate, &c.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).*

Glass Dishes.—For many purposes in connection with photography, glass dishes must ever take precedence of all others, from their power of resisting the action of all kinds of solutions, and the facilities they present for the preservation of perfect cleanliness. Until comparatively recently, good glass dishes were difficult to procure. Now, however, we believe, good flat moulded dishes of solid glass may generally be procured at reasonable prices. Still, there may be many cases where these are not within reach, or where special sizes, not usually made, are required. In these cases, building up or cementing pieces of plate glass, presents a ready means of meeting the requirement.

The first point for consideration in the manufacture of such dishes, is the cement to be used. To meet the necessities of the case, it should be strong, tough, easily applied, and, at the same time, insoluble in, and without action upon, the solutions to be used. Several cements have been recommended for the purpose by different manipulators, each giving the preference to the one he has had success in using. We have tried most of them, for various purposes, with more or less of success.

An article sold under the name of Diamond Cement, we have often found useful for joining small articles in glass, but it lacks strength and toughness for large articles likely to be subjected to much strain or tension. The following is the usual recipe given for making it:—Soak isinglass in water until it is soft, and then, by the aid of gentle heat, dissolve it in the smallest quantity of spirits of wine which will serve the purpose. To two drachms of this add ten grains of ammoniacum, and let it dissolve. To this add two drachms of gum mastic, dissolved in three drachms of rectified spirit. The whole is to be well mixed together, and then kept for use in carefully-corked bottles. When required for use, the bottle is placed in hot water, which liquefies the cement; it is then applied to the glass to be joined with a camel's-hair pencil. It soon hardens, and, when once thoroughly set, becomes altogether insoluble in water.

Sealing-wax, either softened by heat, in the usual way, or dissolved in wood naphtha, methylated spirit, or strong alcohol, also forms an excellent cement for glass; but as the colouring matter is often of a doubtful character—generally being some salt of mercury or lead—it is better avoided for photographic purposes.

White stick lac, to be used in the same way, has been strongly recommended; but as the lac, in the process of bleaching, loses something of its strength, it is inferior for cementing purposes to the same gum unbleached.

Shellac is one of the best and most available cements for glass. It may be applied either by the aid of heat, or by dissolving it in wood naphtha, or methylated spirit. Pure alcohol is, in all cases of this kind, an unnecessarily expensive solvent. The solution should be made thick—say three or four ounces of gum to the pint of solvent. It may be applied to the edges to be cemented with a small brush. It should here be remarked, however, that whilst the cement is much more manageable and easy to use when thus dissolved, it possesses, from some unexplained cause, much less strength than when softened by heat alone. When the latter method is used, the glass should be made sufficiently hot to melt the shellac, which is rubbed along the edges to be joined. The glass may be made hot, and the lac melted by the flame of a spirit-lamp, but in this case care should be taken not to burn it at all, or its strength will be much impaired.

Marine glue has proved, in our hands, by far the best cement for glass, in the manufacture of all chemical vessels. It is easily applied, very strong, tough, and durable, resists considerable tension, and is quite innocuous. One great drawback to its use is the fact that it is not everywhere procurable. We believe the only manufactory in London is in the Commercial Road; but it is generally kept by dealers in cutlery and tools. The recipe for manufacturing it—which, by the way, we have not ourselves had occasion to try—stands thus: Cut three or four drachms of india-rubber into fine strips, or shavings, and dissolve in four ounces of pure mineral naphtha, or benzole. To aid the solution, it should be put in a warm place, or in a vessel of hot water, and frequently shaken. To this add seven or eight ounces of powdered shellac, and melt the mixture over the fire, keeping it well stirred. When thoroughly mixed, it is poured on plates of metal, to cool in sheets. To this recipe we would add a caution as to the melting over the fire. Mineral naphtha or benzole readily vapourising, and being highly inflammable, the process, unless very carefully conducted, will be a highly dangerous one.

It may be softened by heat, and used as we have above described for shellac; or by heating to about 250°, it liquefies sufficiently to be applied with a brush.

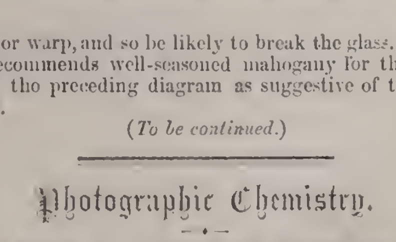
A variety of other cements are used for joining glass, but we know of none more efficient or less injurious than those we have named.

The glass to be built up into dishes, &c., should be plate glass, sufficiently stout, and cut perfectly true to the sizes required. The edges to be joined should be ground, for the double purpose of making them perfectly true and level, and causing the cement to adhere more firmly. The best method of effecting this is by means of emery and water.

It is in all cases desirable, especially if the dish be at all large, to have an outer frame of wood or gutta percha, to give the built-up glass dish strength; otherwise, in lifting it, the sides or ends held in the hand run great risk of being pulled off by the weight of the dish.

If gutta percha be used, the commonest will answer the purpose, as purity is not of importance; or an old and imperfect dish may be made to answer the purpose quite well. The various pieces having been cut to the required size, and ground true, the side and end pieces should be cemented, by any of the means we have described, into their respective places; the bottom piece should then be cemented into its place, having been, of course, cut so as to fit within the sides and end pieces, which will thus by its pressure be kept in their places. It will be found an advantage for many purposes to place a sheet of white paper underneath the bottom of the glass, prior to fixing it, as there will then be no difficulty in seeing when the dish is clean.

Where a wooden frame or casing is used, the point of importance is to choose well-seasoned wood, not likely to cast,



contract, or warp, and so be likely to break the glass. Mr. Lake Price recommends well-seasoned mahogany for the purpose, and gives the preceding diagram as suggestive of the mode of joining it.

(*To be continued.*)

Photographic Chemistry.

COMBINATIONS OF CARBON WITH OXYGEN—(*continued*).

Oxalic Acid C_2O_3.—This acid exists in many vegetables, especially in sorrel, to which it gives the peculiar acid taste which distinguishes that plant, which probably is the reason why the opinion of its beneficial medicinal powers is so general

* Erratum.—In No. 73, p. 248, of the present volume, article "Amateur Mechanic," line fifteen from the commencement, for *purity* read *unity*.

among the lower and uneducated classes. It may be prepared artificially without difficulty, by boiling sugar with slightly-diluted nitric acid. The acid supplies the oxygen, the sugar the carbon; binoxide of nitrogen and carbonic acid aro given off, aud there remains in the liquor oxalic acid, which is deposited, on cooling, in the form of crystals. The proportions of sugar employed should be as one to six of nitric acid. The oxalic acid obtained in this way will contain a small quantity of nitric acid; it will therefore be necessary to dissolve it in boiling water, and crystallise it afresh. The crystals have the formula $C_2O_3 + 3\ HO$. If it be heated to boiling point in a current of dry air, or exposed for a long time in a vacuum, it loses water to the extent of 28 per cent. of its weight, corresponding to two equivalents of water; but to deprive it of the third equivalent, the acid must combine with a base; any other method of trying to remove it would lead to the decomposition of the acid into carbonic acid and carbonic oxide. Oxalic acid is an energetic acid which combines with bases, and produces perfectly defined salts; it easily drives carbonic acid from all its combinations. It is a deadly poison, and has frequently been swallowed in mistake for Epsom salts, which it resembles. It was at one time frequently employed for suicidal purposes, but since the knowledge of other and more deadly poisons has become common, it has been almost entirely abandoned for this particular use. The combinations between carbon and hydrogen are very numerous; they are termed *hydrocarbons*, or *hydrocarburets*.

Marsh gas, otherwise *fire-damp*, is formed of a combinatiou of carbon and hydrogen, CH_2. It sometimes issues in large quantities from fissures in coal mines, and is the gas which bubbles up from the bottom of stagnant pools of water, over which it may be collected by inverting a bell-glass, and stirring the mud at the bottom; the bubbles which will be seen rising to the surface contain the gas. Obtained in this way, it is not pure, but mixed with a little nitrogen and carbonic acid. It is formed in these stagnant pools by the decomposition of vegetable matter contained in the water, from which it probably derives the unpleasant odour which marks it when obtained from this source. To obtain it in a pure state, heat a mixture of acetate of soda and an energetic base, such as caustic potash, or lime, or the two combined, with a little water, in the form of a paste, in a small glass retort. This gas is colourless, and, when pure, inodorous; it burns in the air with a blue flame, the results of the combustion being water and carbonic acid. Its specific gravity is less than that of common air, hence it accumulates in the workings of coal mines, and forms explosive mixtures, which cause the deaths of a great number of miners every year, those who escape being burnt by the explosion frequently perishing from suffocation by the carbonic acid generated by the explosion.

The analysis of the gas under consideration may be made by ntroducing 100 measures into the eudiometer, along with 200 measures of oxygen. An examination of the contents after the passage of the electric spark, will show that there remains 100 measures of carbonic acid and water. As only 100 parts of the oxygen were taken to form carbonic acid, it is clear that the remaining 100 must have been absorbed in the formation of the water; hence the inference is obvious that the proportion of hydrogen contained in marsh gas is to carbon as two to one.

Bicarburetted Hydrogen C_2H_2, or, as it is usually called, *Olefiant Gas*, may be prepared by mixing alcohol with five or six times its weight of concentrated sulphuric acid in a gas flask, and applying heat. At first, alcohol makes its appearance, then ether; but as the temperature increases, these disappear, the mixture becomes darker, and bicarburetted hydrogen, carbonic acid, and sulphurous acid, are liberated. To obtain the bicarburetted hydrogen without the other gases, the products of the decomposition on quitting the retort must be made to pass through a solution of caustic potash, and then through a wash-bottle containing a little concentrated sulphuric acid. The latter absorbs the ether vapour, and the alkali absorbs the carbonic and sulphurous gases. It is not indispensable to employ the bottle containing the sulphuric acid, as the products which come over first may be allowed to escape into the trough, and the jar which is to collect the gas inverted over the tube, only when the operator is satisfied that the ether vapour and alcohol have ceased to make their appearance. The olefiant gas thus obtained is colourless, neutral, and has the slightest possible odour. It is soluble in alcohol, ether, and other substances, but is less soluble in water. Its density is about 0·981. It burns in the air with a brilliant flame, and, if mixed with oxygen and fired, it explodes with extreme violence. Tho analysis of this gas is made by passing into the eudiometer one measure of olefiant gas and three measures of oxygen. After the passage of the electric spark, it is found that the contents have been converted into carbonic acid, of which there will be exactly two measures. It will be seen, therefore, that bicarburetted hydrogen contains two volumes of hydrogen, combined with twice the quantity of carbon contained in the marsh gas. The proportions by weight will bo 12 parts carbon aud 2 hydrogen.

It derives its name of *olefiant* gas from an agreeable ethereal odour, which it possesses when combined with chlorine. The two gases combine in equal volumes, and an oily liquid is formed which possesses tho odour referred to, and a rather sweet taste, and is termed chloride of hydrocarbon, or Dutch liquid.

Olefiant gas is decomposed by passing it through a porcelain tube, heated to a bright red; the carbon is deposited on the sides of the tube. The carbon may also be separated from it by mixing the gas with twice its volume of chlorine in a tall jar, and applyiug a light; the flame travels rapidly down the jar as the two gases unite, and the carbon is liberated in the form of a dense black smoke.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

*** Up to the hour of going to press the ordinary letter of our Paris Correspondent had not reached us.

THROUGH JAPAN WITH A CAMERA.*

(*From our own Correspondent.*)

Our passage across the stream safely accomplished, though not without much difficulty, and a great deal of anxiety while the palanquin containing the camera was on its way across, we continued our journey in a diagonal line, instead of following the road which would have taken us directly across the mountains. We had a double object in this: one was to visit some ancient ruins, and the other to get some wild-fowl shooting on a lake at no great distance. I was especially delighted at the idea of getting some shooting, for, notwithstanding all my attempts to encourage myself by reflectiug that I was, perhaps, the first European who had ever voluntarily traversed the interior of the country, I could not help feeliug tired sometimes, for the novelty had quite worn off as regards the people, and the pleasure I still felt in travelling about was such as I should have felt in travelling in any country which I had not already visited. The lake in question was reached on the second day after we forded the river; not that it is so many hours' journey from the spot as the time mentioned may appear to indicate, but we halted early, in order to avail ourselves of the accommodation offered by a roadside inn, as there was no other within a reasonable distance. As it was still early when we arrived here, we decided on taking a picture of the cluster of cottages which constituted the village, which were very picturesquely situated. It was with something like satisfaction that I put together just the articles necessary for our purpose, for the heat had decreased so much that I could manage to work in a tent without being bathed in perspiration, which was not the case during the hottest part of the day. The cottages were nicely situated to get a good picture of them, and I succeeded in a way which was not usual. The rays of the sun fell in a slanting direction upon the creepiug plants which covered the front of the buildings right up to the thatched roof, and thus illuminated the recesses of the plants in a manner which would not have been the case if the rays had fallen more perpendicularly.

* Continued from vol. iii. p. 251.

Behind the cottages rose a cluster of tall trees, the foliage of which was lighted up brilliantly, and between them one could distinguish the summits of the mountains in the distance. Under these circumstances, I could hardly fail to get a good negative; and I did not. Even the inscriptions on the door-posts, which even the poorest here are so fond of having, that they generally find the money for paying the village artist, or the wandering monk—if I may so term a member of the religious fraternity of which I have already spoken—to paint them in the curiously-formed characters of their written alphabet, are distinct and sharp; which is not generally the case in my negatives, so that I have failed to record many a fine sentiment which I have seen inscribed, in various colours, at the entrance of a little cottage, or miserable hut, the inhabitants of which I should have thought too ignorant to appreciate or comprehend philosophical maxims.

After the image had been properly developed, and the plate dried, it was put away in its place in the box, and the apparatus sent back to the inn, Dsetjuma and I going into one of the cottages, as was our usual practice, to have a talk with the inhabitants. In one sense, we were rather unfortunate this time, for we found a poor woman in great trouble, because her child, a little thing hardly two years old, lay at the point of death. It was a painful spectacle to see the little creature stretched out on a mat beneath the opening which served as a window, through which a current of air entered now and then and stirred its dark hair, but awakened no sign of sensation in the thin, fair face across which it swept. Though ignorant as anybody can be of the signs which indicate approaching dissolution, I could not doubt that the little innocent before me was past all hope—would it not be better to say, in such a case, all fear?—of recovery. The poor mother rose, and looked at us with momentary curiosity, which faded away in an instant under the absorbing affliction of her anticipated loss. An old woman stood beside the mat; and every instant she would take up the little wasted hand and then lay it down again. Evidently she was the grandmother; and though age had dried up the sources of tears, she grieved none the less because she gave no outward sign of grief. It was not long since I had seen a man dying, but the circumstances connected with it had lessened the horror I might otherwise have felt, and it did not affect me to nearly the same extent as the sight of this little girl. As we stood silently looking at the little being, who was already past suffering, and on the very threshold of another world, I realised, for the first time, how intimate is the tie which unites the members of the human race, and how insignificant are the distinctions derived from colour or language. Who can think of such differences when they see a fellow-creature on the point of passing through that mysterious phase which we term death? I could not have felt more sincerely grieved if the child had been the daughter of one of my countrywomen. For me, a stranger, to have spoken to the poor mother under such circumstances, would have been cruel; so, just touching the cold forehead of the infant with my lips, and laying a few coins on its dress, I left the cottage, a sadder man than I had entered it.

As we sat at dinner, I remarked to Dsetjuma that I had seen no indications in the cottage of a medical man having visited the sick child; and it appears, from what he told me, that it is not the custom in the rural districts to give medicine to such very young children; the people think that if a child has not strength sufficient to overcome its illness without medicine, medicine would be of no avail. Indeed, I may observe here, that the Japanese, as far as I have been able to judge, have very little faith in physic, and, except in certain diseases for which specifics are administered, they seldom trouble the vendor of drugs.

The next morning we started early, in order to reach the lake in time to make our arrangements for shooting the wild fowl early on the morning succeeding our arrival. We had had some heavy showers in the night, and the sky was covered with thick clouds all day, so that we were less scorched on our journey than usual, and were able to push along with greater rapidity. We had still three hours of daylight before us, when we arrived at the few huts in which the men lived who got their living by fowling and fishing on the lake. When I say lake, perhaps I ought to mention that its dimensions were by no means those which occur to the mind on hearing the word; it was, in fact, in my opinion, unworthy of the name; however, as Dsetjuma called it a lake, I shall do the same. The lake, then, was a piece of water of no great superficial area, but, as the men told us, and as we afterwards found, of immense depth near the centre. The river we had forded ran into it on one side, and out of it at a point almost opposite; and I am disposed to think that the lake had been formed during one of the earthquakes, which used to be far more severe at one time than they have been of late years. All around the lake grew tall reeds, which formed the haunt of the water fowl, and served also for thatching the huts, and for various other purposes.

(*To be continued.*)

Proceedings of Societies.

Blackheath Photographic Society.

At the last meeting of this Society, Mr. Skaife read a short paper on "Photographic Instantaneity," by way of introducing to the meeting his new photographic instrument, which he calls a pistolgraph. After explaining its construction, the inventor gave a practical illustration of its working, by taking two or three rapid pistolgrams of one of the gaslights, all of which he excited, developed, and fixed, by plunging each plate successively into three little jars containing 1½ ounces of fluid each. He then explained how, by superposition, a transparent positive was taken, sufficiently defined to yield, by one operation of enlargement, a negative from ten to fifteen times the diameter of the original pistolgram—half-a-dozen successful examples of which, plain and coloured, were handed round to the members for their inspection, together with two or three cases of photo-pistolgrams chromo-crystallised, including a view of the last Greenwich election, a boat scene on the Thames, and sundry portraits of dogs, horses, and children, the novelty and beauty of which elicited repeated expressions of admiration, coupled with surprise that such a pistolette should have been capable of producing them.

To a question put by a Member, why the machine was called a pistolgraph, instead of a camera, Mr. Skaife was understood to say—because, amongst other reasons, the instrument, with the exception of its lenses, had nothing in common with ordinary photographic lenses; so named rather from their outward shape than otherwise to the *camera lucida*, invented some three hundred years ago by a Neapolitan *savant*.

The Chairman, in proposing a vote of thanks to Mr. Skaife, observed, by whatever name the instrument was called, its performances indicated a competency to realise more satisfactory portraits of children than any other photographic camera known.

Photographic Notes and Queries.

Has the vapour from pine any detrimental effect on the nitrate bath?

Sir,—I see, in No. 71 of the "Photographic News," that a correspondent, "H. R. R," is of opinion that the vapour from deal was the reducing agent of a silver solution. I ask him whether the vapour from deal and that of gutta percha be one. If the vapour from gutta percha does not possess the same reducing agent, "H. R. R.'s" argument is at an end. I prepared a nitrate of silver bath in the beginning of July, which was composed of thirty grains to the ounce of distilled water, and a few drops of acetic acid,

which worked well for about five or six days. I should say that I did not sensitise more than forty one-sixth size plate, when I found it was not capable of silvering the collodion plate. I accordingly tested the bath, and found that the strength of the bath was not more than ten grains; the solution when made was placed in an air-tight gutta-percha bath, which had been in use not more than six months. It always worked well before, and I am working it now quite perfect without the least ill effects at present. I am quite sure that the ill effects were not resulting from the gutta percha; the collodion that I had in use when my bath was so quickly reduced, was Ramsden's positive. The temperature stood at 110° in the dark room, and I am of opinion that owing to the heat of the dark room, a large deposit of ether and alcohol had accumulated in the bath, and the heat of the weather had partially decomposed the collodion; and I further am of opinion that the reason, and the sole reason, the bath was so quickly reduced was the decomposition of the collodion, or that the ether and alcohol were impure. I have also another reason that the reduction of the silver was not owing to the gutta-percha bath, and the fault was in the collodion. I had in use the same day a large glass bath, mounted in mahogany, with a solution in it newly-prepared, and met with exactly the same vexatious effect. Can "H. R. R." now assert or think that the vapour from pine was detrimental to the silver bath? If the vapour from pine does injure the silver bath, the vapour from gutta percha and mahogany must possess the same reducing effect; but what vapour can there arise from a dry piece of mahogany through a glass bath to injure the silver solution?

J. Prideaux.

DRY PROCESSES.

Sir,—When I saw the first letter of your correspondent, "M. N. P. S," I made a few experiments to try its value, and succeeded so well that I have adopted his plan entirely, and thank him for the same. I think, however, that the exposure should be prolonged about one-third; if this is not attended to, it will give a chalky negative, and be wanting in the half tones.

I merely address this note to you to confirm your correspondent "M. N. P. S.'s" theory, and to show that one at least has succeeded.

For printing glass transparencies this process answers admirably, giving remarkably clear whites, and by it I have printed some lantern slides which are really first rate.

Thomas Clarke.

DRY PROCESSES FOR INDIA.

Sir,—As I shall probably go to India during the present year, I am desirous of obtaining any information your correspondents can kindly afford me. I have not quite made up my mind whether to take out a quantity of Taupenot's plates, albumenised (11 × 9 and stereoscopic size), and sensitise them when required, or to try one of the paper processes. I do not think Norris's or Fothergill's plates would have much chance of keeping during the voyage. I shall be very much obliged for any hints as to what process will be most likely to be successful. H. M.

[Perhaps some correspondent who has had practical experience on the above subject will favour us with the desired information.—Ed.]

GLASS STEREOGRAMS.

Sir,—If all your subscribers are as enthusiastic admirers of the stereograms on glass of Messrs. Clouzard, Ferrier, &c., as myself, they will naturally be anxious to know the methods by which these pictures are produced. I am a subscriber to your journal and to the *Journal of the Photographic Society*, and in neither of these publications have I found any instructions for producing these exquisitely-toned stereograms.

If any of your contributors will give the results of his experience in an early future number, he will confer a great boon upon many photographers, among whom will be

Expectans.

[A long article on this subject was given in our second number.—Ed.]

CLEANING GLASSES.

Sir,—You may perhaps think the following worth insertion:—Never soak glasses for a long time in a strong solution of soda. Last week I was at a place I shall never probably re-visit, all my apparatus with me, but I completely failed in getting a picture from alkalinity of the bath. I found, on putting acetic into it, one picture came right, the next was worse than ever. This led me to think about the way I had cleaned the glasses, and on soaking them in solution of potass, and cleaning, of course, the same bath and chemicals gave capital pictures. W. H. Walter.

STOPPING OUT SKIES.

Sir,—The following will be found a good plan for stopping out skies.

First get a print from the negative, and cut out the sky, and lay it on the negative, so as to screen the picture from the black varnish; you have now only to draw the brush upwards from the paper, and you will be able to do it to a greater nicety than by tracing along the top of the picture, and run less chance of soiling it. T. C.

TO CORRESPONDENTS.

C. Thwaites.—1. The best plan with which we are acquainted for testing a lens, is the one given in our first volume, page 2. The stop should always be placed in front of the lens. 2. Even supposing the exposure and development of Fothergill plates to be correct, they would scarcely give you satisfactory results. 3. After being kept a month, you might obtain many excellent pictures from them, but they would be uncertain, and just at the time that you particularly wished for a good picture, stains or fogginess would make their appearance on developing.

Housekeeper.—Well wash the stained part of the carpet with a solution of 1 ounce of cyanide of potassium in 1 pint of water, and then wash it again in clean water. If the whole of the stain is not out, repeat the operation. The carpet need not be taken up, but the cyanide must be well washed out of it. If this be carefully done, the colours will be much improved by the operation.

Lovely Sneddon.—The iodised paper seems very well prepared. The length of exposure is so entirely a matter of experiment, that we cannot give you any idea of the time to give it. Try one or two pictures, varying the length of exposure in each. The alteration of colour and partial marks made by one sheet on the other, are not of any consequence.

Ignoramus.—1. The terms "crystallisable" acetic acid, and "glacial" acetic acid, mean the strongest acetic acid which can be made. Either term may be employed. 2. See index of our second volume, or the "Photographic News Almanack" for this year.

S. S. S. L.—The best method of electro-plating on iron, is to coat the bright iron first with a thin deposit of copper in a battery, then deposit the silver on the top of this from a silver solution with a Smee's battery.

P. P. C.—The concentration of a nitrate of silver bath made in the ordinary way will not be likely to injure it, provided lightbe excluded, and the temperature used is not higher than about 150 degrees Fahrenheit.

Emil. Seelig.—The pictures are quite satisfactory, and your name will appear in the next list, which we hope shortly to publish.

J. L. F.—We can give no opinion on the subject alluded to, not having seen, to our knowledge, any apparatus made by the workman mentioned.

A. B. C.—Theoretically, it would answer very well, but, like many other theoretical statements, it would not answer in practice.

N. O.—Add very little nitrate of silver at first, and when the picture makes its appearance you may gradually add the remainder.

J. E. Browne.—Received with thanks.

T. C.—We cannot advise on such a point.

John Q.—*Linen* collodion is said to adhere very firmly to the glass.

Sivi.—We are not acquainted with the address.

J. W. W.—We do not like the negative process of printing.

Communications declined with thanks:—F. O. X.—P. L. A.

The information required by the following correspondents is either such as we are unable to give, or it has appeared in recent numbers of the "Photographic News:"—M. R. U.—A. H. Y.—P. R. R. P.

In Type:—G. H. W.—Oxoniensis.—W. H. Jennings.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, if addressed to the office, should be marked "private."

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 75.—*February* 10, 1860.

THE ARCHITECTURAL PHOTOGRAPHIC ASSOCIATION.

On Wednesday last the Exhibition of the above association was opened at No. 9, Conduit-street; and whether viewed with regard to the number and excellence of the works of art displayed, or the attendance of visitors, the promoters may, we think, congratulate themselves on having achieved a well-merited success. The specimens of sun-painting are arranged and classified so as not only to impart full effect to the scenes they depict, but to arouse the mind to the contemplation of the many and important historical incidents with which they are inseparably connected. Set apart in a room by themselves are some of the finest productions of the camera, representing our own cathedral, civic, and palatial architecture, while those from Spain, Rouen, Rome, the Roman States, Constantinople, Jerusalem, France, and the North Italian States, fully evidence the skill, taste, and enterprise of the photographers of the present day. Space precludes us from entering into a critical and minute description of the pictures. This we shall do at another time; but at present we must confine ourselves to the enumeration of a few of the principal exhibitors, as follows:—Signor Ponti, and Messrs. Robertson, Bent, Macpherson, Cundall, Downes, Melhuish, Clifford, Bedford, Greenish, Fenton, Cocke, &c. &c.

A *conversazione* was held in the rooms in the evening, for the purpose of hearing a paper by Professor Donaldson, illustrative of the collections of architectural views now being exhibited. The chair was occupied by Professor Cockerell, president of the Royal Institute of British Architects, and the large room or gallery, which is used for purposes of exhibition, was filled by an influential auditory, chiefly connected with the profession. Several ladies were present.

The Chairman said he felt sure the ladies and gentlemen present would see with great pleasure the photographs which were exhibited on that occasion. He believed the collection was larger, more complete, and far more perfect, photographically considered, than had ever yet been exhibited. He was happy to see Mr. Donaldson there for the purpose of explaining and illustrating the beautiful sun-pictures, and he felt sure the services of that gentleman in so doing would be very warmly appreciated. He would take that opportunity, though he was upon the committee, of saying a word or two respecting the services of that body. For himself, he had not the merit of having laboured at his post, or of having fulfilled the duties connected with his position, so that he felt he might, with propriety, ask for the approbation of the Association to be given to those gentlemen, who had so earnestly and successfully given themselves to the work of getting up this exhibition, as members of the committee appointed for that purpose (hear, hear). He would also take that opportunity of explaining, in a few words, the nature of the institution with which the present proceedings were identified. In this commercial country, it was often thought there was a commercial object in putting these things before the public, and inviting its attention and patronage, as they had done, to those undertakings which were obviously so very advantageous to the art and science of architecture. That was not the case. The present exhibition was due to the professional zeal of some of the younger members of the profession, and he thought that fact should be better understood than it appeared to be. He had perceived, with some pain, that the motives of their leading members had been misunderstood, and that their very liberality (for so it was) had not been comprehended. He felt sure, that if persons would consider who the gentlemen were who undertook the work, the way in which it was carried out and the advantages it offered to the public, it would soon be better understood that this was a work of love on the part of their younger men. He had seen with pain, that once or twice their leading members had been treated as if they were tradesmen, which was altogether a mistake. He felt sure, however, that he need not, before that audience, advocate at length the claims of the society in that or in any respect. He cordially recommended the works before them for their merit, their interest, and the way in which they had been put before the association. For his own part, he saw, with great pleasure, works which he had not beheld for a period of forty years. In 1810 he had the gratification of visiting Constantinople, and he now saw for the first time since then accurate representations of many of those buildings which he had viewed so long ago, with so much pleasure. The sun-pictures which he now saw upon the walls, were of a very superior character, and gave the details of each building so distinctly, that one might almost proceed to build from them. He had now very great pleasure in introducing Mr. Donaldson, and in recommending his remarks to the very great attention of the meeting. He would illustrate far better than he (the Chairman) could, the merit of the works now exhibited.

Professor Donaldson, who was received with cheers, said that it was in 1840, about twenty years ago, that being at Paris, he had the opportunity of seeing M. Daguerre, whose invention and whose labours had excited the admiration of all classes. A medical friend, now no more, had called upon him to request him to name a time when he should accompany him to M. Daguerre's studio. He (the Professor) was then deeply engaged for the two or three days during which he had to remain in Paris, but he said that, if M. Daguerre would receive him some morning before eight o'clock, he should consider it a great favour. His friend returned to him with an appointment at six o'clock in the morning, and he availed himself of it. They went to the modest residence of M. Daguerre, in the Boulevards, at the appointed time. M. Daguerre was a man of most pleasing manners, frank, and agreeable, and was then in the height of his fame. He explained to him the whole of his process, and showed him the results in some charming daguerrotypes, mostly of lay subjects, such as casts, flowers, carpets, furniture, &c., grouped together. He was then in the enjoyment of a pension of about £240 a-year for the very fine discovery which he had made, but he only lived a very few years to receive it. Had he been permitted to survive till the present time, to see the results which they were now obtaining from his invention, he might indeed be permitted a feeling of deep and sincere exultation. He (the Professor) would, he was sure, not be called upon to apologise for having directed their attention to the man to whom they were so deeply indebted, for, although our own countryman, Mr. Talbot, arrived almost at the same

moment at the same result, yet they should always bear in mind that M. Daguerre was the first man who comprehended those phenomena of light, and discovered those chemical affinities, and succeeded in throwing open to the enterprise of the wide world that most noble invention; so that there was now hardly a village in this country which had not its photographic establishment to take the portraits of the whole population, or the views and points of interest in the neighbourhood. Before he parted from him, he presented him with a small specimen of art—one of the earliest of the kind which had been brought to this country, but he had most unfortunately lost it. Photography, in relation to architecture, was one of the most important discoveries of the day, and was extremely useful to architects, whether regarded as artists or men of science. The simplest building, devoid of meretricious ornament, lost nothing when made the subject of a photographic picture, while, at the same time, the most elaborate structures of Rome, mediæval monuments, &c., were depicted in all their elaborate details and correctness, light and shade. Each point had its full prominence, and all were harmoniously subjected in due relation to the whole. The rapidity with which photographic views were taken, was a very important consideration. In foreign countries, where suspicion sometimes followed the track of the lover of art, it was sometimes found necessary to him to abandon his delightful task before he succeeded in taking the view, which he was desirous of transferring to his paper. He (the Professor) had often, when travelling in Asia Minor, diverged from the direct road to catch a glimpse of some important or interesting spot, and had often been forced to depart without obtaining the views which he wished, whereas, with the apparatus which photographers now employed, it was possible in a comparatively short space of time to obtain a correct and vivid image of the desired object. If photography had been discovered two or three hundred years ago, what precious memorials should we not now have had of countries visited by Rabbi Benjamin and Marco Polo; what mementoes should we not now have had of Greece and Asia Minor, and other parts of the classical world? The Professor then proceeded to draw attention to various objects of interest in the room, classifying them according to the countries from which the views were taken. Commencing with Rome, he observed, that there were many associations connected with the word Rome, of a religious and an artistic nature, and that he almost shrank from venturing upon a subject which seemed to rise so immeasurably high. Two of our countrymen were amongst the chief photographers of Rome; he alluded to Messrs. Macpherson and Anderson; the former had contributed to that exhibition several views of Rome and Italy; and amongst them, he had sent that scene of solemn and desolate grandeur, "The Roman Forum," the scene of the renowned amusements and games, where eighty thousand could assemble within its ample walls to witness—where hundreds of lions were brought into the arena to try their strength, and where numerous gladiators, and, probably, Christian martyrs fought and died. He would call especial attention to the views of the Colosseum at Rome, as combining gracefulness of effect and correctness of detail in a most harmonious result. He also mentioned the views of the temple of Antonius and Faustina, the theatre of Marcellus, whose arches were now occupied as common dwellings, and one of the lower arches of which was used as the smith's shop, which was so well known to all the students of Rome. Other towns of Italy were also represented. Assisi had its temple of Minerva, and at Narvi the bridge of Augustus still remained to attract the attention of students. It was forty years since he had first beheld one of those beautiful Roman monuments which were exhibited on that occasion, and the lapse of time had not obscured the impression which he then received. The combination of grace, harmony, and beauty of detail, revealed to him a new world of delight. He felt he could not pass over that portion of his subject without passing an eulogium upon that wonderful artist, Peruzzi, whose thorough knowledge of perspective, whose vivid imagination, and whose skill in the combinations of light and shade, gave him a peculiar power in grouping, and the result of which was a series of views which overpowered all criticism, and carried one away with enthusiasm. Following the flight of the Roman eagle, the Professor next led his audience out into the realm of Spanish art, tracing the influence of the Roman struggles with Carthage in that country upon the growth of art, as manifested in the numerous remains which were so beautifully delineated in the photographic views of Mr. Clifford. He alluded more especially to a view of the ruins of the Roman theatre at Merida, and a beautiful picture of the interior of a corridor of the Alhambra, which, he said, was now rendered familiar by the masterly work of Mr. Owen Jones in the Crystal Palace. Numerous other views were exhibited, and the lecturer drew particular attention to those of Gothic architecture on the door of *Santa Maria del Mare*, and of the Cathedral of Leon, as showing how specific minuteness was blended in those pictures with the grand and the sublime. More modern art receives its illustrations in the Puerta de Alcala, at Madrid, and in the custom house and theatre of Barcelona. These were evidences of art-feeling as existing in Spain, although they were not so pure and so lofty as those which existed in other capital cities of Europe. There was, however, much of art to be learned in that country. The Spaniards were a people of vivid imagination, and formerly derived great wealth from their American possessions; and they employed very liberally artists of the first reputation, to ornament their religious structures and their public edifices. Their past works offered suggestive hints to warm the imagination of artists from the colder regions of the north of Europe. Passing on to Venice, the Professor gave a brief history of the numerous works of art which are to be found in that renowned city, drawing a distinction between those features in them which were classical and elevating in their tendency, and those which were wild and voluptuous. He described the Venetian merchants as being endowed with great taste and liberality in their patronage of high art, and as devoting great attention to the adornment of their public edifices, their squares and churches. He attributed much of this refinement in taste to their intercourse with the renowned Bysantium, whence they derived many of their most striking monuments. The views taken from Venice, and exhibited upon the occasion, were very numerous and beautiful. One might almost fancy oneself walking in the midst of the façades, columns, monuments, and palaces of that city of the waters. The view of the "Palace of the Doge" was one of the most telling monuments of modern art. The Professor proceeded to descant upon the merits of the numerous sun-pictures, illustrating the various points of interest in Venice. These views were characterised not only by faithfulness, but by a certain richness and strength of outline peculiar to photography. In the course of his remarks he dwelt lightly upon many points of interest, historical and classical, connected with several of the views he was exhibiting. Referring to cathedral architecture, he said there was nothing more wonderful than the unbounded expenditure of the Christian Church during the brief three centuries of the mediæval period. The erection of Gothic cathedrals was entirely a gratuitous work. One could not traverse the length and breadth of England without being struck with the number and beauty of the religious edifices erected within this period; and in France, Germany, and Spain, there were similar indications of that ardent spirit which resulted in the erection of cathedrals and churches of vast extent, and comprising cloisters, chapels, oratories, and towers, rising many feet towards heaven. The monks went from palace to palace, and from cottage to cottage, gathering from all classes of the people the means with which to build these edifices. Our English cathedrals were illustrated by many views in the gallery. The civil and domestic architecture of the mediæval period was also illustrated by many striking views, and our own true, happy England, with its Gothic abbeys, churches, baronial halls, and colleges, was represented by many pictures, upon which he could not now stop to enlarge. In connection with these works he would mention the names of Mr. Fenton and Mr. Cocke (to the latter of whom he could not refer without expressing his gratitude for the personal obligations under which he lay to him), of Messrs. Dolamore and Bullock, Mr. Robinson, of Leamington, and also of Mr. Bedford, who was not only so well known to the profession as a photographic artist, but who was particularly successful in his combinations of building and landscape scenery—views remarkably clear and distinct in all their various tones. Many present would remember Chepstow, and upon looking at the views which that gentleman had contributed to the Exhibition, they might almost fancy themselves there. The Professor concluded his remarks by saying, that his object had been to offer a few brief, passing suggestions,

to guide the researches of others—to show how fine a subject architecture was for photographers, and how, in return, photography might become a teacher of the architect. The paper, of which the above is but a meagre outline, was listened to with great attention and interest, and the Professor, upon resuming his seat, was greeted with hearty applause.

The CHAIRMAN said he was quite sure he should be commissioned by the meeting to offer to Mr. Donaldson their most sincere thanks for his admirable paper, to which he had listened with the greatest interest, and which was worthy of the highest admiration.

The resolution was passed, and on the motion of Mr. Mair, a vote of thanks was unanimously accorded to the Chairman.

The proceedings then terminated.

COLLODION FOR THE DRY PROCESSES.*

BY T. F. HARDWICH, ESQ.

BEFORE passing on to consider further the chemical nature of the changes which take place by the action of alkalies on collodion, it may be well to observe how cautious we should be in recommending any new step in photography without stating all the conditions. The addition of potash, for instance, is a most hazardous proceeding, and one which may bring disappointment. The mode of preparing the pyroxyline must be taken into account, since some kinds are much tougher than others, and will resist a larger quantity of alkali without becoming limpid. This I show by taking three kinds of collodion—*a* from parchment pyroxyline; *b* from cotton wool immersed in hot and weak nitric acid, with minimum of sulphuric acid; *c* from pyroxyline made out of calico. On adding a similar quantity of alcoholic solution of potash to each, the first becomes glairy, and subsequently liquefies to the proper consistence, turning at the same time slightly yellow. The second remains colourless, and precipitates a thick white substance, above which floats a limpid liquid almost free from dissolved pyroxyline. The third behaves differently from either, being liquid from the first, and not passing through the ropy stage.

The action of potash upon pyroxyline is decidedly complex; and, although Mr. Hadow has interpreted it under certain conditions, it does not appear to me that the reactions are the same when the alkali is employed in a minute quantity, and at a low temperature, as I advise. One thing, however, is clear, that, under all circumstances, *nitrite* of the base is formed; and, indeed, I have seen definite crystals of nitrite of potash in residues of iodised collodion after fourteen months' keeping.

An alkaline nitrite—such as that of potash or soda—precipitates a white compound with nitrate of silver, and this substance is only sparingly soluble in water. Therefore, if we suppose a collodion to contain nitrite in addition to iodide, the film, after removal from the bath, may be expected to bear a very large amount of washing without entirely losing its soluble silver salt. The effect of nitrite in the *wet* process is to accelerate development, and to increase the contrast between the extreme tints. I find that it acts in the same manner in the dry process; and hence it may prove of service in some cases. Collodion containing nitrite even to saturation does not produce the same decision of image as that to which potash has been added. This I attribute in part to the fact of *organic decomposition* of the pyroxyline being produced by the potash, which renders it more difficult to wash out all the soluble silver salt. The subject is a difficult one, and needs more investigation, but I will mention a few facts which bear upon it. There are organic substances which produce no precipitate in solution of nitrate of silver, and yet can be shown to combine with it in a loose and ill-defined way. One of these bodies is *gelatine*, as the Committee who reported on the subject at the late meeting of the British Association have shown. If a sheet of gelatine be dipped in a nitrate bath, no subsequent washing will altogether cleanse it from the nitrate of silver; on the other hand, gelatine will withdraw nitrate of silver from its aqueous solution, and appropriate it to itself. The substance produced may be termed "gelatino-nitrate of silver," and one of its properties is, that it has the characteristic bitter metallic taste, but gives no precipitate with a minute quantity of chloride of sodium. I find also that *powdered gum arabic*, on being digested in alcoholic solution of nitrate of silver, retains some of the nitrate most obstinately; for if the gum be dissolved in water (after repeated boiling with fresh portions of spirit until nothing more can be extracted), the solution has a strong bitter taste, and remains clear for a time on the addition of chloride of sodium. A third experiment was conducted as follows:—Pyroxyline of that kind which has been fully acted on by the sulphuric acid in the process of manufacture, and which the experience of photographers shows to give an unusually intense image in the negative, was soaked for one hour in an alcoholic solution of nitrate of silver, in the dark; it was then washed very carefully in about twenty changes of distilled water—the washing being continued long after all traces of free nitrate of silver had disappeared; nevertheless, this pyroxyline, on being dissolved in ether and alcohol, gave a brown turbidity with hydrosulphate of ammonia, and on being treated with salt remained nearly clear at first, but afterwards became slowly opalescent.† It must be confessed that the above experiments are, with the exception of that in which gelatine is used, of an extremely delicate nature, and could not safely be depended upon if taken alone; viewed, however, as corroborative of other undoubted facts, they are interesting—and, since the photographic and the chemical results tally so exactly with each other—we may safely affirm that, although pyroxyline is usually viewed as indifferent to salts of silver, yet that there are some varieties of that substance which are more or less organic in their reactions; and, further, that any sample of pyroxyline, after undergoing partial decomposition by action of alkalies, will abstract a portion of nitrate of silver from the bath, independent of the presence of nitrite, chloride, or iodide. Pyroxyline, in this state, takes its place as the lowest member of that class of photographic substances containing albumen, &c., all of which are useful in processes where the plate is washed with water previous to its exposure in the camera.

At the outset of this investigation, I had hoped to perfect a method of purely dry collodion without any preservative substance applied to the surface of the film, but at present I am not so sanguine of being able to do so. The principal defect of Fothergill's process is the slowness of development, which appears to be due in part to the film drying up, and not recovering its porous condition on being wetted. Gum or gelatine prevents this; for, although the film shrinks, as before, on drying, yet when water is applied, it returns to the spongy or villous state which it had on first leaving the bath, and the development is accelerated. The experiments which I have made confirm all that Dr. Norris has advanced, but they lead us a step further, for it is now impossible to deny that these preservative substances have a chemical as well as a mechanical action, and that the colour and general aspect of the image will vary with the particular organic substance which is selected.

* Concluded from vol. iii. p. 258.

† A pure solution of nitrate of silver throws down a precipitate immediately, with chloride of sodium; but when these organic substances are present, either no precipitation whatever occurs, or the liquid remains clear for a time, and afterwards becomes gradually opalescent. In the same manner, collodion prepared from that kind of pyroxyline of which we have been speaking, may contain a weighable quantity of chloride of cadmium, and yet, on dipping in the bath, no precipitate may be produced, the film remaining clear and transparent.

DESCRIPTION OF A CHEAP AND DELICATE BALANCE.

BY MR. EDWARD THOMPSON, OTTLEY.

THE chemical student is often an example of "the pursuit of knowledge under difficulties." The druggist's apprentice

has many obstacles to contend with in his attempts to acquire a knowledge of experimental chemistry, arising from want of time, books, instruction, or apparatus. In many cases his progress is stopped for want of an accurate balance. The shop scales in daily use are not sufficiently delicate, or they do not carry a sufficient weight, though they may answer perfectly well for pharmaceutical purposes; while a balance by Oertling, or other first-rate maker, costs more than the student's limited resources will allow him to pay. If, therefore, the apprentice can be shown how to make a balance for himself, accurate enough for most chemical purposes, I think a benefit will be conferred upon many struggling and deserving individuals. My present object is to explain how this may be done.

I must premise that the idea of this balance, and some of its details, were derived from a well-written paper by Mr. J. B. Cooke, which I found copied from the *Mechanics' Magazine* into the "Photographic News" of August 19th, 1859. It is not necessary to detail the differences between Mr. Cooke's balance and my own; it will be sufficient to say that I have retained the principle of his method of producing sensibility, while I have obtained a degree of portability and facility of construction to which Mr. Cooke will probably not lay claim.

In this instrument, the beam consists of a piece of mahogany or other wood, say eighteen inches long, one inch broad, and less than a quarter of an inch thick. A piece of thermometer tube, two and a half or three inches long, is inserted through the middle of this beam, so as to stand as nearly as possible perpendicular to its sides, and to project from them at equal distances. This tube is securely fixed in its position by tying it down to the underside of the beam by means of waxed string, afterwards covered with sealing-wax. Thus are formed the beam and its fulcrum, which require to be raised twelve inches or more on some suitable support. This may be formed of a box opening in front, which may contain the weights when not in use; or it may consist of an ornamental framework of wood. In either case, the top should be nearly as long as the beam, and should project beyond the lower part six inches at one end, so as to allow room for the scale pan, which, as will presently be seen, is connected with one end of the beam only.

The fulcrum rests on two similar pieces of thermometer tube fixed on the framework on each side of the middle of the beam, and parallel with it, and at such a distance from each other that the beam may freely move between them without contact. These glass supports should be raised upon pieces of wood, so as to allow the bottom of the beam to stand about three-eighths of an inch above the top of the frame.

A piece of sheet lead, heavier than the greatest weight which it is intended that the balance shall carry, in addition to the weight of the scale pan, is now to be screwed upon the upper edge of one end of the beam, so as to hang over on each side. This piece of lead is to form the permanent counterpoise to the weights and substance to be weighed, which are both to be suspended from the other end of the beam. Mr. Cooke suggests that three tiers of scale pans should hang by the same strings, the lowest and largest to hold the matter to be weighed, the middle one for the largest weights, and the upper one for weights below ten grains. The strings supporting these pans are united at the top, and connected by means of a metallic hook with a piece of silk cord having a loop at one end, and attached by the other to the end of the beam, which should be brought to a point or edge, so that the string may hang freely from it.

An iron or brass screw is now to be fixed in the beam, immediately over the fulcrum, and projecting above the beam about half an inch, upon which a circular nut, weighing 200 grains or more, moves from the top to the bottom. A slip of paper may be pasted on the side of that half of the beam which is next to the scale pans, upon which the space may be divided into ten equal parts, with subdivisions. In order to prevent the beam from having too much play, two bent brass wires or glass tubes are to be fixed upon the upper part of the frame, at equal heights and at right angles with the ends of the beam, allowing the latter to move up and down not more than 1-20th of an inch. The less movement the beam has, so that it be appreciable, the more speedily are its indications noted. That the slight movements of the beam may be more easily observed, a bit of glass tube may be cemented in a line with and just below the scale end of the beam, but so low as not to touch it when down. When a light is placed behind the balance, the beam in its descent cuts off a reflexion from the top of this tube.

The balance is now made, but in the state in which it has been described it is not a delicate instrument, nor fit for use at all. To become so, it requires to be adjusted. In an ordinary balance, other things being equal, the sensibility depends upon having the fulcrum placed as little as possible *above* the centre of gravity. It must not be *below* it, or the beam will be overset with the slightest impulse, and will remain down at either end indifferently. The fulcrum must not be exactly *in* the centre of gravity, or the beam will cease to vibrate; and it must not be too much *above* it, or the beam will become somewhat like a pendulum, and lose its sensibility. Now the delicacy of an ordinary balance depends upon three things: 1st, that little friction occur between the movable parts; 2nd, that the beam and pans be light; and 3rd, that the fulcrum be properly placed with regard to the centre of gravity. These requirements are complied with in the balance described: there is little friction between the parts forming the fulcrum and its supports; the beam is made of light material; and the centre of gravity is adjusted in the following manner:—So long as the sheet of lead placed at the end of the beam remains flat, the centre of gravity is above the fulcrum. This will be shown, without knowing exactly where the centre of gravity is, by the oversetting of the beam at either end, when nearly balanced. To bring the centre of gravity of the whole beam below the fulcrum, the piece of lead is to be bent down at each side, until the beam remains down at one end, and cannot be made to do so at the other. This, however, may be called the rough adjustment, as it is not likely that great accuracy can be attained by bending down a piece of lead. The nut and screw over the fulcrum form the fine adjustment; and by moving the nut up and down upon the screw, the centre of gravity may be raised or lowered at pleasure, and with the utmost exactness. Supposing that a platinum wire weighing 1-10th of a grain be used as a rider, to be placed on different parts of the divided half of the beam, then the adjustment should be so made that the beam descends and ascends by the removal of the rider from one part to another. The smaller the difference between one position of the rider and another, so long as the beam repeatedly falls in one position and rises in the other, the greater the sensibility of the balance. Mr. Cooke says that he made a balance which weighed one pound, and turned when loaded with 1-100th of a grain; and my method of construction must necessarily result in a balance *at least* as sensitive as his. But without calling in question Mr. Cooke's assertion, my experience, with his balance and my own, does not justify me in asserting that such extreme sensitiveness is attainable with beams resting on glass tubes, and without glass cases to prevent the disturbing influence of currents of air.

Weighing by substitution, as it is called, is the method adopted with this balance. It is described by Fresenius (*Quant. Anal.*, p. 22) as yielding "not only relatively, but also absolutely, accurate results, no matter whether the arms" of an ordinary balance "be of exactly equal lengths or not, or whether the scales be of equal weight or not." When a substance has to be weighed in this balance, it is placed in the lowest scale, and weights are added in the upper ones till the beam is brought into a state of equilibrium.

Then the substance is taken out of the scale, and weights introduced till the beam is again in equilibrium, when the number of grains substituted indicates the weight of the substance. The use of the rider on the divided beam is obvious, and enables us to dispense with weights smaller than itself altogether.

In planning this balance, cheapness and facility of construction have been constantly kept in view. There is nothing in the whole instrument but what an apprentice can make with his own hands, except, perhaps, the nut and screw of the fine adjustment, which he can easily procure. And when thus made, and taking the lowest estimate of its sensibility, the balance will serve for taking specific gravities, for alkalimetry and chlorimetry, for ascertaining the strength and purity of pharmaceutical preparations, and for most technical purposes.

Should a difficulty present itself to the student arising from his not possessing weights corresponding in accuracy with his newly-constructed balance, it may be overcome in the following manner. Let him in some way or other procure a single accurate weight—it matters not to what amount—and he may from this construct a set for himself from pieces of brass, or brass or platinum wire, &c. "Regular weights," says Faraday, "of considerable accuracy are easily obtained, by cutting off equal or given lengths of a copper wire, the wire being of such a thickness, that at least half an inch in length may be allowed for the smallest weight; its uniform thickness should be ascertained by trying the first and the last weight cut off against each other" (*Chem. Manip.*, 2nd ed., p. 66). Even if an exact weight cannot be procured, the same writer suggests that substitutes for weights may be made, by means of a balance, by adjusting pieces of metal, to have equal, double, triple, or any other proportion of weight to a standard piece, and, being used as weights at the time, without any others, will give proportional results; or, if results comparable with other weights are required, their value may be estimated by actual comparison at a future convenient opportunity. The latter plan, however, should not be adopted, unless absolutely necessary. The young chemist would perhaps act wisely in at once adopting the French system of weights, as it is universally used on the Continent, and is becoming more and more employed in this country.—*Pharmaceutical Journal.*

THE SOLAR CAMERA.

We were among the first to signalise the appearance in Paris of the ingenious American photographic apparatus, termed by the inventor a solar camera. Explicit as our article was, as regards the admirable results which might be derived from this new optical combination in the production of positives of natural size, and even larger, from very small negatives, it did not sufficiently explain the internal mechanism of the instrument, which, differing so little from apparatus constructed by other opticians and photographers for a similar purpose, it was not surprising that reclamations of priority should be addressed to us from all sides, as well as to the French Photographic Society. We the more willingly return to this subject, as it is one of great interest to photographers, and Count Aguado has assured us, after numerous experiments made at the end of last autumn, that the solar camera opens an entirely new road to them. He dwelt on the striking spectacle it was to sit in the room he has had constructed for working with this camera and watch the silent progress made by the light in painting a gigantic portrait, which can only be obtained, under ordinary circumstances, of greatly-reduced proportions, and in absolute darkness.

As to the principle of the apparatus, we have no difficulty in avowing that there is nothing new in it; it is simply an application of the theory of conjugate foci, of which we can give a perfect idea which will be readily understood.

Let us imagine a model seated before a camera, whose portrait is depicted on the collodionised glass placed in the centre of the camera. It is one of the most elementary laws of optics, that if, after having traversed one or several series of optical media, and undergone any number of refractions and reflections to attain a given point, the luminous ray turns round and follows a direction exactly opposite to that it formerly took, returning backwards by precisely the same road it pursued in its advance. If, then, we suppose the small portrait of the model in question, formed by the convergence of the optical pencils starting from the different points, the total of which constitutes the model, instead of being a product of the light, it becomes, on the contrary, a luminous focus, while the model itself is replaced by a sheet of sensitised paper, the rays starting from the portrait thus converted, as it were, into the source of light, will trace on this sheet a new portrait having exactly the same proportions. In the first case, we had a small portrait begotten of the rays starting from the model; in the second case, we shall have a large portrait begotten by the rays starting from the small image. There is all the secret of enlarged reproductions, and this secret, we once more repeat, is nothing but an elementary application of the principle of conjugate foci. Whatever may be the particular combination utilised for the purpose of obtaining enlarged reproductions, it will be found to be based on this, which does not prevent any one of these combinations from differing from another in some particular, and having a peculiar individuality of its own, and therefore making it the legitimate property of its inventor. This peculiar characteristic, which cannot be derived from the principle of the apparatus, since that is common to all, it will be necessary to search for, in each particular case, in the manner in which the small negative is illuminated; in the greater or less proportion of the rays emitted by it, which are collected and concentrated, and the efficacy of which is assured; and the most perfect of the enlarging instruments will incontestably be that in which all the rays radiating from the negative shall be rendered efficacious, and all, absolutely all, contribute to the production of the positive on a large scale. Now, Mr. Woodward's solar camera possesses this advantage of utilising all the rays borrowed from the luminous source, and this is what constitutes its great merit—why it gives, in no very long time, greatly enlarged prints, in which all the details of the negative are indicated of their exact relative value. To demonstrate this incontestable assertion, a fact, an irreproachable life-size portrait, is the most convincing of proofs; but as all our readers cannot, like us, view this palpable evidence, we shall demonstrate the fact by reasoning, supported by figures.

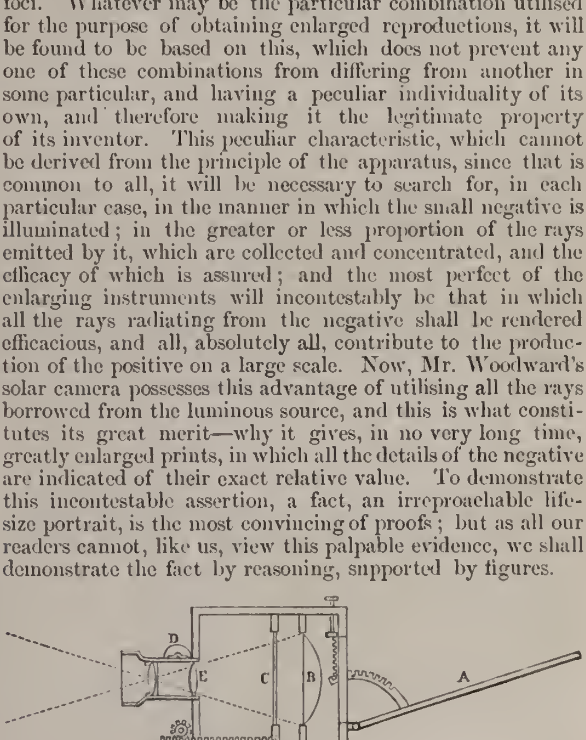


Fig. 1.

Fig. 1 represents Woodward's solar camera. A is the inclined mirror, which receives the direct rays of the sun in all their brilliancy, and directs their parallel into the camera; the design also indicates the simple and well-known mechanism by which the inclination of the mirror may be varied, according to the position of the sun, so as to receive the greatest possible number of his rays. B is a simple plano-convex lens, of a sufficiently large diameter to collect all the rays reflected by the mirror, and convert this large bundle of parallel rays into a convergent bundle or cone, the summit of which, the common focus of all the rays, exactly coincides with the optical centre of the second lens of the compound or combined object-glass E, which object-glass is as perfect as possible, and similar to the best object-glasses of ordinary cameras. C is the negative, borne in a movable frame, which may be moved backwards or forwards within certain limits, by means of the rack and pinion, so as to obtain more or less enlarged images, according to the will of

the operator, which image may be inspected on a screen placed behind the object-glass. By this eminently simple arrangement, all the rays reflected by the mirror, passing through the negative, serve to produce the enlarged positive, without the loss of a single ray; their divergence does not begin except at the moment and at the point when they have done their work on the sensitised paper.

Can the same be said of the other combinations? Certainly not; and, to satisfy ourselves on this point, it is only necessary to inspect the plans—figs. 2 and 3—of the principal of those exhibited at the French Photographic Society.

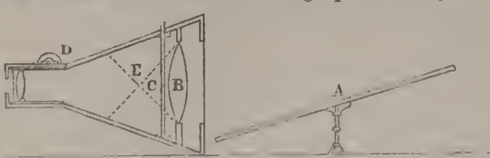


Fig. 2.

In fig. 2, A is the inclined mirror; B the collective lens, with its very short focus in E, the posterior summit of the convergent cone, the anterior summit of the divergent cone. C is the negative no longer placed in the converging pencils, but in the diverging pencils; it is evidently only illuminated by a portion of the rays collected by the lens B, and it is this fraction only of the primitive solar illumination which contributes to the formation of the image that the compound and combined object-glass will project on the sensitised surface.

Fig. 3.

The same thing happens in the combination represented in fig. 3, in which the combined object-glass is replaced by a simple achromatic lens. In these two combinations the light which illuminates the negative is derived from a diverging bundle of rays; it is only a fraction of the primitive light, and that is the reason why the positive image is rendered in such a feeble manner, and why it is so much slower in developing itself. It is travelling in a wrong direction to borrow the light for illuminating the negative from a bundle of diverging rays. In fact, in this way, only a very weak illumination is obtained. We may recall the circumstance, that, not long since, in speaking of M. Porro's ingenious photometer, we mentioned that the most simple and efficacious method of estimating a given light, was to cause it to traverse one or two converging lenses; we even said that with only two lenses, of very short focus, the light of the sun was reduced to the ten-millionth part of its intensity, and that with three lenses it was almost completely extinguished. Mr. Woodward's combination, therefore, is perfectly rational.

Let us add, in concluding, that M. Bayard was probably right when he affirmed that the great interest or advantage of the solar camera would consist, not so much in printing enlarged positives from a small negative, but in enlarging the negatives, so that they might be printed from in the ordinary manner. In this way great loss of time would be avoided, and more complete results would probably be obtained.—*Cosmos.*

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

HOW TO MAKE A SET BACKGROUND.

A SET background is made by the subject, either exterior or interior, being formed and painted on a variety of different frames and pieces, either upright or longitudinal, and, when arranged and placed in their proper positions, forming a complete and picturesque whole. All these set pieces should be made of thin deal frames; the deal used to be about three-quarters of an inch thick, and from three to four inches broad, half lapped at the corners, glued, and tacked together, forming an open frame, thus:—or, a narrower

upright piece, thus:—on the sides or top, pieces of strong paste or millboard are fastened, by glueing or tacking, so that mouldings, ornaments, or projections, can be cut out to their proper shape with a sharp knife or large pair of shears.

The frame to be covered with holland or canvas; the subject marked out in vandyke brown, and then shaded in bold and strong. As very slight fastenings will keep them steady on the floor, a strong wooden block,

fastened on the inner side of the bottom edge of each frame, and a couple of gimlets twisted through, will answer every purpose, and make them steady and secure; or, if the floor of the operating-room should be covered with oil-cloth or carpet, rendering it objectionable to bore a gimlet hole, the block at the back of each frame might be made very broad and heavy, so that each set would then remain perfectly steady—the latter upright ones supported against the back of a chair.

The various set pieces, as above described, when canvassed, painted, and cut out in profile, and then placed—the upright

piece, with figure on the top, at the left-hand side; the small frame, with vase on top, about three or four feet distant, on a line; then the balustrade piece, with the

openings cut out to join the same; and an upright drapery piece to fill up the right-hand corner; while the backing and distance can be painted on the wall or a separate piece,—the whole, we say, when formed and placed, will give a background as here represented. The pieces can be shifted nearer or further; and, with a few additional millboard ornaments, vases, and mouldings, a variety of backgrounds may be formed from the same pieces. A tree and foliage piece can be introduced in lieu of the drapery corner, to give the idea of an exterior; while the drapery corner, and a few articles of furniture, with a piece of oil cloth on the floor will, for groups and double figures, give the idea of the interior of a pavilion or saloon looking out on the lake. The distances to be kept low, to clear the heads.

MR. LAKE PRICE ON COMPOSITION AND CHIAR-OSCURO.

We have the satisfaction of announcing to our subscribers that we have made arrangements with Mr. Lake Price, the well-known artist and photographer, to contribute to our columns a series of original articles, composed expressly for this journal, upon a subject the desirability of information respecting which has been urged upon our attention by many interested in photographic pursuits—namely, Composition and Chiar-oscuro.

We have no doubt that from Mr. Lake Price's knowledge of the principles of art, combined with his experience in photography, he will be enabled to offer much valuable information to our readers. The first article will appear in our next number.

GENERAL OBSERVATIONS ON PHOTOGRAPHIC POSITIVES.*

BY MESSRS. DAVANNE AND GIRARD.

OF FIXING—(*continued*).

Applied to practical photography, these observations lead to important conclusions. They indicate, in fact, the cause of the sulphurisation of the prints. When we take an absolutely new solution of hyposulphite of soda, and with it wash a print, it dissolves a certain quantity of double hyposulphite of soda and silver; at the second washing it dissolves a fresh quantity of this salt, and so on, until it has reached the point of saturation, which, as we have seen, it reaches very rapidly when we use a solution at 10 per cent. From this moment the bath will still fix, but, becoming saturated with double salt, it begins decomposing. If we then present another proof charged either with nitrate or chloride, these will act as soluble salts, and henceforth will exercise on the dissolved double salt a slow but certain action. Both in the paper and the bath will, in the first place, be deposited double salt, then hyposulphite of silver, and, finally, sulphide of silver and sulphur. The hyposulphite bath will still fix, and it will even do so until all the sulphur of the hyposulphite has been converted into sulphide of silver; but from that moment in which it is saturated with double salt, it will produce, both on the print and in the bath, a deposit of sulphurised substances, which will inevitably lead to a change in the print.

Therefore, without in any way prejudging the practical conditions of the fixing, which will form the subject of a special paragraph, we may say now that the print on removal from the printing frame ought, in the first place, to be washed in water, which, removing the free nitrate of silver, diminishes the quantity of this salt which would otherwise find its way into the hyposulphite bath, and therefore economises it; also, that the washing of the print in salted water, that is to say, the conversion of the nitrate into chloride, is simply a work of supererogation, because it does not at all diminish the quantity of silver brought in contact with the hyposulphite, and, consequently, does not retard the moment of its saturation; finally, that the hyposulphite bath ought not to be employed for more than a very limited number of proofs, which must be determined by the degree of concentration of the bath, consequently by the energy of its solvent action on the double salt. We shall return to this subject when we establish the practical conditions of a good fixing. We will merely observe now, that, according to our experiments, the double hyposulphite of soda and silver acquires, in presence of certain salts, such as nitrate of potash, marine salts, &c., great stability, which justifies the practice recently proposed of saturating the hyposulphite bath with marine salt.

The second cause of the alteration of the fixing baths, and, as a consequence, of the prints immersed in it, is due to the addition of certain acids to the bath, such as acetic acid. This method, which was introduced some years ago, is pretty nearly abandoned now; therefore we shall trouble ourselves very little about it, and merely mention the fact to put it on record. A fixing bath so prepared necessarily leads to, according to the reaction, (*d*) $C_4H_4O_4+S_2O_2NaO=C_4H_3O_3NaO+SO_2+HO+S$, a deposit of sulphur on the print. This deposit, which forms somewhat slowly, is more or less considerable, according to the proportion of acid employed, but it is constant, and the simultaneous presence of sulphur and silver on the print necessarily leads to its alteration sooner or later. Therefore this method ought on no account to be followed.

After examining whether the various fixing agents used in photography left any substance in the proofs capable of influencing their permanence, we next proceed to examine what action these same fixing agents exercise upon the coloured portions.

In a study of this kind, a simple comparison between proofs of various hues is not sufficient; the appreciation is, in fact, too difficult, and rests upon differences too delicate to seize upon. Yet, in simply employing this mode of investigation, we observe certain facts which may furnish some clue.

For example, we know that by leaving a photographic picture in a strong solution of cyanide of potassium, it entirely disappears, in consequence of the whole of the coloured portion being dissolved by the fixing agent. On the other hand, when a proof is plunged in ammonia, we perceive, after it is fixed, that it increases rather than diminishes in intensity; and even if left a long time in contact with this fixing agent, we perceive the *whites* become tinted in a palpable manner, even if not very intense. Lastly, if the fixing agent employed be hyposulphite of soda, no apparent effect is visible under ordinary circumstances. But these are only uncertain indications, and to throw light on this important question, it must be studied from another point of view.

Our experiments have previously established that after a suitable fixing, the proof is formed of two different substances mixed in variable proportions—metallic silver, and the argento-organic compounds. It is these, and these only, that constitute the coloured parts of the proof; therefore, it is upon them that the ordinary re-agents, after having fixed the proof, can exercise a subsequent destroying action.

Starting from this fact, we propose to examine whether, independently of every accessory circumstance, the fixing agents can exercise a dissolving action upon these two substances.* With this object we have, on the one hand, prepared some metallic silver by the reduction of the chloride by light alone, and, on the other, some argento-organic matter, by placing in similar circumstances a solution of starch containing chloride of silver in suspension. The precipitates thus obtained were, after the action of the light, fixed. Thus fixed, they were placed in solutions of cyanide of potassium, of the strength of 2 per 100 of concentrated ammonia, and of hyposulphite of soda of 10 per 100; then, after the lapse of various periods of time, we have examined the supernatant solutions for the presence of silver. Operat-

* Continued from vol. iii. p. 257.

ing in this manner, we have observed very important differences in their mode of action.

First, with regard to cyanide of potassium. This re-agent attacks and dissolves metallic silver as well as the argento-organic compound, but it acts much quicker upon the first than upon the second. After one day of contact, the solution covering the metallic silver already contained notable quantities of this metal: the solution that covered the argento-organic compound also contained some, but in smaller quantity, at the end of two or three days only; the result obtained with this latter equalled that furnished by the first. These facts, observed under clear and precise conditions, lead us to understand why positive photography cannot employ the energetic dissolving properties of cyanide of potassium. This agent fixes very rapidly and well, but the action it exercises upon the coloured portions requires too much care and precaution. In fact, it is a dangerous re-agent.

The action exercised by ammonia is entirely different. We have already insisted upon the peculiar coloration which, by a phenomenon of dyeing, this re-agent communicates to the argento-organic compound; but there is another point of view, extremely important in practice, to which we must call attention. When we leave silver, the argento-organic compound, for instance, in contact with strong ammonia, we perceive, even after eight days of contact, that the ammonia has not removed the slightest traces of silver from either, by which we may conclude that ammonia dissolves, in no respect, the coloured portions of the proof; but a curious phenomenon exhibits itself at the same time; for, whatever care may be taken, the ammoniacal liquor over the two precipitates does not become clear, but constantly remains opaline, and seems to hold in suspension a scarcely perceptible yellow precipitate, as if dissolving at first a small quantity of silver, the ammonia immediately deposited it in a state of ammoniacal combination. From this follows the explanation of the influence that the fixing by ammonia exercises upon the white parts of the proof, and communicating a light yellow tint to them. We may, in fact, attribute it to the formation of this yellow precipitate, which we have constantly observed in the supernatant ammoniacal liquors, whether of metallic silver or the argento-organic compound. At the moment when the proof is plunged into the ammonia, the iron-coloured parts are rapidly dissolved, but, if the sojourn be prolonged, an action is established between the coloured layer and the alkali, an action which is shown by the formation of a precipitate which is deposited equally upon all parts of the proof.

As to the new hyposulphite of soda, it acts upon the coloured parts of the proof, not like ammonia, but in the same manner as cyanide of potassium. Put in contact, in a state of solution, with the silver and the argento-organic material, it ends by partially attacking and dissolving both, only (and the daily experience of photographers also proves it) it acts with much less energy than diluted cyanide. Still, its action is very evident, and indicates, *à priori*, for every fixing compound, the necessity of not leaving the proofs too long in the fixing bath. We shall take care, in a subsequent chapter, to state the lapse of time approximatively necessary for fixing with solutions of hyposulphite of soda of different degrees of strength.

To sum up what has been stated, we say:—That cyanide of potassium, even when diluted, rapidly removes the coloured portions of the proof. Ammonia does not dissolve them, but at the end of a certain time, this alkali, by means of a silver compound, tints the whites of the proof yellow; as to the hyposulphite of soda, it attacks the coloured parts of the proof; but this action takes place only after a long time.

Such are the principal facts which we have been able to recognise by means of our researches upon the action exercised upon the proof by the fixing. We shall next group them together, and endeavour to deduce results by which a surer and more rational method of fixing may be established.

(*To be continued.*)

Dictionary of Photography.

Kaolin.—China Clay. A compound of silica and alumina, forming a very pure white clay, used in the manufacture of porcelain. It is successfully employed in photography for depriving nitrate of silver baths of the colour acquired by the introduction of organic matter, as in floating albumenised papers, &c. Paper coated with kaolin is employed for printing positives upon, of exceeding fine quality.

Laboratory.—The operating-room or workshop, wherein the chemical operations of photography are performed. The arrangement of such a room requires certain conditions to be fulfilled, such as good ventilation, an ample supply of water, the means of excluding light, &c. To prepare the sensitive agents employed in photography, and to preserve the products that would be acted upon by the chemical agency of white light—such as collodion, the salts of silver, &c.—it is necessary to have a room lighted only through yellow glass. On the side exposed to the direct rays of the sun, the windows should be closed, with the exception of a small aperture covered by yellow glass, double, so that not the least particle of white light can penetrate: over this a black curtain should be placed, so as to enable the operator to diminish the amount of light as much as possible. But if the room has no external opening, light may be admitted through an aperture in the door, or the partition of the adjoining apartment, in which case a single thickness of yellow glass will be sufficient.

A room lighted in this manner is much better than a dark room lighted by a candle or lamp, because even feeble artificial light acts chemically upon sensitive surfaces: besides, operations can be carried on with much more facility in a good supply of light, than in a dimly illumined apartment, and the risk of accidents from ether and alcohol are avoided.

Around the walls shelves should be arranged, of about eighteen inches in width, and about three feet from the ground; they will also serve as tables; and it is a good plan to place a second tier, of the same dimensions, at the distance of about eight inches beneath them. This second tier will be found very convenient for receiving things which require to be removed from the upper shelves, and for keeping paper dishes, frames, &c., upon. Above these wide helves there should be placed other narrower shelves to holds bottles, &c.

It is best to appropriate the different sides of the room to different operations: one for cleaning plates, another for coating them, and another for developing; this latter should be near the window, and contain a sink, with a waste pipe leading into a proper receptacle for preserving the liquids containing salts of silver.

Every funnel, measure, &c., should have its special use and appropriate place, to prevent confusion, and to avoid unpremeditated decomposition in the agents employed.

The "fixing" should not be attempted in this room, as it involves the introduction of hyposulphate of soda, and the slightest trace of this salt, in contact with an excess of nitrate of silver, gives rise to decomposition, forming sulphide of silver, and producing black spots, which would damage all the proofs with which it came in contact.

The fixing should be carried on in an adjoining apartment, if possible; but if it be not, a portion of the operating-room should be partitioned off. There a good supply of water is required, and the greatest cleanliness, order, and care are necessary in all the operations carried on, in order to avoid failures.

The room where the fixing is performed may be lighted by ordinary daylight; but the window should be furnished with a thick yellow curtain, which must exclude the daylight until the proofs are submitted to the ctaion of hyposulphite of soda.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Glass Baths.—Amongst the minor necessities of the photographer's equipment, there is nothing of greater importance than the dipping bath for the nitrate of silver solution. However perfect the condition of the solution itself may be, if the vessel containing it be inconvenient in form, if it leak, if it act on the silver, comfort or success in operating are out of the question. Nay, if the amateur merely suspect the latter fault, fancying that the fog streaks, or spots on his pictures, are the result of the deteriorating action of the gutta percha, or other material of which his dipping bath is made, the consequences are often quite as disastrous, for, whilst this fancy exists, other remedies are neglected, the unfortunate vessel being regarded as the sole source of these evils.

Gutta percha, at least many samples of it which find their way into the market, is said to produce fogging, insensitiveness, and a variety of other evils. The glaze of porcelain, or earthenware, is said to be unable to withstand the action of nitrate of silver, becoming cracked and discoloured. Vulcanite, an article not much used in this country for the purpose, but manufactured extensively into dipping baths in the United States, and regarded at one time, we believe, by our photographic brethren of the States as emphatically the right thing for the purpose, is now, we understand, discarded, as destroying the solution and turning it black. As regards the latter material, we have had no personal experience, but should have readily conceived, *à priori*, that as sulphur entered into the constitution of the article, it could not possibly be suitable for such a purpose. In regard to gutta percha and porcelain, we have already stated of the former, that, if used pure, we believe it to be perfectly innocuous, having had a bath in constant use for upwards of four years, the solution always standing in it, without the slightest injury. We may say in reference to the latter, that we have had two earthenware dipping baths in use, one five or six years, and the other upwards of two years, and, notwithstanding that the solution is always kept in them, we have never perceived any injury either to the vessels themselves, or to the solution. Still there can be no question that glass, where it is available, is the safest, cleanest, and most pleasant material for the purpose. Until recently, however, the baths made of this material were, for the most part, clumsy in construction, difficult to procure, and enormously expensive. Now, we believe solid glass baths of convenient form and moderate price, of the most usual sizes, up to whole plate sizes, are easily procurable. Where large sizes are required, however, they must still be built up, and although we regard such built-up baths as at best but the succedaneum for something better, we offer a few suggestions for their manufacture, where it is necessary to attempt it.

The simplest mode of obtaining a glass bath, or at least the advantages of one, will be readily available to those possessing gutta-percha baths, the purity of which has become doubtful. First cut strips of plate glass to fit the bottom and sides of the gutta-percha bath to be lined, which will, of course, be first thoroughly cleaned and dried. The piece of glass for the bottom is first to be coated on one side, or even tipped at the corners, with any of the cements named in a previous article, and pressed into its place. The cement most convenient for use in this operation will be a thick solution of shellac in methylated spirit, marine glue being only soluble with difficulty in benzole, and a solution is much more easily used, in the manipulation under attention, than cement to be softened by heat. The side pieces are now to be treated in the same way, and each pressed into its place. The pieces for the front and back should be cut accurately, and so as to be tolerably tight when the edges have been ground. If such portion of the surface of the side pieces as these edges press against have been roughed, the joint will be firmer. The edges and one side of the front and back having been coated with the cement, are, in like manner, to put in their places. In order to make quite sure of these last pieces remaining firmly in their places, they should be wedged. The side pieces and bottom are already held firmly by the back and front. The simplest method of wedging is to fill up the bath with plates of glass large enough, and finally wedging, moderately tight, with a thin slip of wood. The bath should then be set aside in a warm place until the cement is quite hard. The joints may now be made additionally waterproof by receiving an extra coating of the shellac solution, applied with a camel's-hair pencil. By this means a bath is obtained with all the advantages of glass in cleanliness, with those, superadded, of gutta percha in strength.

For baths of moderate size, the above plan will answer every purpose. Where extra large baths are required, we would suggest one or two modifications, with a view of economising solution. The same plan of proceeding in most respects should be pursued, but the front and back pieces of glass, instead of being placed flat against the sides of the outer case of gutta percha, should be fixed V fashion. What we mean will be obvious to most of our readers; but, in order to make the matter more plain, we give a section of the bath in the margin, the dotted lines representing the edges of the glass lining. The amount of space between the glasses can be regulated as the manipulator may choose, by altering the angle at which the glasses stand, and placing the bottom edges close together, or apart. To make the bearing of these pieces firmer, three or four strips of gutta percha should be cut the shape of the figure in the margin, and cemented at each side of the bath, and also in the middle of each front and back. These modifications made, the process will be in all respects just the same as described in the preceding paragraph. Without altering the available size of a bath materially, its capacity, so far as quantity of exciting solution is concerned, may be reduced to less than one half. A bath for plates twelve inches by ten inches, requiring from sixty to eighty ounces or upwards of solution, may, after treating in this manner, be filled with thirty or forty ounces. There is amongst some operators, we know, a prejudice against the use of baths holding a small quantity of solution, on the ground that they frequently require replenishing, a process which, when the bath is in prime working condition, they think undesirable. This objection, such as it is, is more than counterbalanced by the fact that if the bath get out of order, or spoiled, there is less of it to waste, and by the fact that replenishing with fresh solution often restores to its pristine good condition a bath that had begun to be of doubtful character. For all experimental purposes, where it is uncertain whether the solution may not be spoiled by the treatment it is about to undergo, baths thus limited in their capacity are especially valuable. Whilst referring to this subject, we may mention a simple expedient which does not appear to have occurred to some of our readers who have complained of inconveniently wide baths. This may easily be remedied by placing in the bath, so as to lean against its back, a few stout plates of glass the size of the bath. The capacity may be limited at will by this means. We have frequently found this a valuable resource when, on a sudden emergency, we have required to excite a large plate, the bath has been found so low in solution as to be insufficient to cover it, and we have not wished to incur either the delay or risk of replenishing it with fresh solution.

An outer casing of wood has been recommended to support and preserve a lining of glass to form a dipping bath. A correspondent some time ago stated his success in making and using baths and dishes of this kind. After cutting the glasses to fit, he says, "I then pour inside a warm solution of gutta percha; fit in my glasses, and make them bed well; when set, which will be in a very short time, I pour in a thin solution of shellac only along the joints to fill up crevices; and when nearly dry, finish them with a strong solution to make all neat. The pieces of glasses are a little higher than the wood, to allow the solution to be poured out." The same plan as the shape of the glass lining can be pursued here as with gutta percha. The point of chief importance in using a wooden casing is to see that the wood be well seasoned, and not of a kind much liable to casting or warping, contracting or expanding by changes of temperature or moisture. If care be not used in this respect, the utmost nicety in manufacture will scarcely serve to prevent subsequent leakage, &c. Well-seasoned mahogany would, perhaps, serve the purpose best; or if any of the more porous

woods be used, such as deal, they should be well varnished at the outset with boiled oil, to prevent the action of moisture. On the whole, where it is available, gutta percha is preferable to wood, and more easily manipulated.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 3rd February, 1860.

"Pluie de Fevrier remplit les greniers;
Beau ciel à Saint Romain (28 Fevrier)
Promet bon an."

Such is a specimen of the old proverbs by which the peasants around Paris endeavour to console the townspeople for the gloomy weather that makes us go out as little as possible during the months of February and March. There is something quaint and, at the same time, poetic in these old popular proverbs; though they do not often procure us a *boná-fide* foreknowledge of the weather, we like them for all that. When December and January have been warm, February is generally cold; when, on the contrary, the two former months have been cold, February is warm, and constitutes, as it were, the commencement of spring. The same argument applies to rain: if it rains much in January, February is dry; and, if January has been dry, February is generally wet. In an agricultural point of view, rain at the commencement of February, and dry winds at the end of this month, are of great importance, and have given rise to the proverb I have placed above.

An astronomical event will occur on the 7th of this month; unluckily, ere this can reach your readers. The moon passed on the 1st the group of the Pleiades, and attains its perigee on the 7th, which day its opposition takes place at 2h. 44m. in the morning, in the constellation Leo. During the opposition, our satellite is only 33 minutes from the arc of the ecliptic, and, consequently, it passes into the shadow of the earth, which shadow extends 45 minutes. The result will be on the 7th a partial eclipse of the moon, towards which, before this letter is in print, many photographic camera will, doubtless, have been presented.

Some weeks ago I had in my hand some very small photographs of the moon, taken during an eclipse; they were, as near as I could judge, scarcely one-ninth of an inch in diameter; and, on looking at them through a powerful botanical lens, I was much astonished by the relievo they showed. The effect was almost, if not quite, as perfect as if the images had been seen stereoscopically.

I well remember the eclipse of the moon that took place on the 27th February, 1858, and which, luckily enough, was perfectly visible in Paris. The day had been very cloudy, and, as the evening approached, the clouds got thicker and thicker. All hopes of observing the phenomena were given up, when, about half-past eight o'clock, a warm current of air having attained the higher regions of the atmosphere, the thick vapours and clouds were immediately dissolved, and disappeared as if by enchantment, leaving visible a beautiful blue sky, in which the full moon shone gloriously. The Parisian astronomers were on the *qui vive* from this instant.

Arago once observed, during a full eclipse of the moon, a slight polarisation of light in the dark red colour of the completely eclipsed disc. This polarisation indicated reflection, and Arago attributed the phenomenon to rays of light, which, coming from the sun, were refracted by our atmosphere into the cone of shadow produced by the earth, and which, after attaining the moon's surface, were reflected back to us. M. Liais, of the Imperial Observatory, endeavoured, during the eclipse we speak of above, to repeat this observation of Arago's, but without success; not a trace of polarised light could be discovered. It is true, however, that the eclipse of the 27th February was only partial, and that Arago was only once able to observe the phenomenon in question. During this same eclipse of the 27th March, 1858, Liais, Babinet, Foucault, and Bulard, remarked that the inferior border of the darkened portion of the moon was of a superb blue colour, which they explained by regarding it as an effect of contrast; in other terms, a species of optical delusion. Dr. Phipson says, in *Le Cosmos* of the 5th of March, following:—"The same phenomenon was observed by ourselves. We certainly did remark at different times a blue colour on the border of the dark disc, but we attributed it to a defect in our object glass, for, by moving the latter, the blue colour disappeared and was replaced by a red tint . . . . But we also observed a very singular deformation on the dark disc. About the middle of the eclipse there was a marked irregularity in the curved line, which limited the obscure part of the moon's surface. Instead of representing a regular arch, it showed, about the centre, a peculiar indentation, which, though slight, was almost observable with the naked eye. This was not noted, to our knowledge, by any other observer, although Babinet tells us he thinks he saw something of the sort, and attributes it to an optical illusion arising from the proximity of some dark spots on the moon to certain parts of the obscure disc. This scarcely explains what we said; however, let us hope that our earth is still round, as before, whether its shadow appears so or not."

My excellent friend Signor Govi, professor of physics at the Technological Institution of Florence, has just communicated to the Paris Academy of Sciences a description of a new *Photometer*. "The difficulties one meets with," says he, "whenever it is necessary to compare two sources of light of different colour, have suggested to me the idea of a photometer, in which this comparison takes place between rays of equal refrangibility." It is difficult to give an idea of the instrument without the aid of a figure. It consists essentially in a prismatic box, elongated horizontally, and having two openings in each of its opposite vertical (and smaller) sides. In these openings are two tubes, having each a slit at their extremity, and in the middle of the box, precisely in the direction of the two slits (which are vertical), are fixed two rectangular isocele prisms of pure glass, placed so that their hypotheneuse sides are opposite one another, whilst, two sides being vertical, the other two meet by the acute dihedral angle, and form a horizontal plane. Above these prisms is an achromatic lens, large enough to admit the entire beam of light which, coming from the two slits, is refracted through the prisms. The rays which have passed through the lens are received upon a large equilateral prism of flint glass, which is brought by a gentle movement to a position which gives the minimum of deviation to the mean rays of the spectrum (say, the rays E). Leaving the prism, the dispersed rays fall upon a plate of ground glass, placed perpendicularly to the mean rays of the spectrum. By this disposition, two spectra of equal length are obtained, and touch one another by their borders. When it happens that the two slits receive rays of equal intensity, then two spectra appear as one; but when one source of light is more powerful than the other, to which it is compared, it must be removed to a certain distance, and until the effect required is obtained.

In a former letter, I mentioned the process by which M. Liebig precipitated silver upon glass to produce the "silvered mirrors" employed for telescopes or photography. In this process, when aldehyde reduces the salt of silver, the liquor contains an acid which forms a salt with part of silver. Liebig supposed that this salt contained a new acid, whose formula, $C_4H_4O_3$ or $C_4H_5O_4$, falls between aldehyde and acetic acid. To this substance the name of aldehydic acid was given. MM. Heintz and Wislicenus have recently found that, during the reduction of salts of silver by aldehyde, no such acid is formed, and many experiments have shown them that when aldehyde is oxydised by oxide of silver, acetic acid alone is produced.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

The huts were miserable looking places externally, but when we got inside, we found that they were more comfortable than their appearance promised. This was accounted for by its being no unfrequent circumstance for gentlemen to come and spend two or three days in the pleasures of shooting. There were two staying here at the moment of our arrival, so that we were able to get a pretty good dinner, which, probably, would not have been the case had it been otherwise, and short commons in Japan is, to a European, no joke. We had only one gun, and I had no great faith in the strength of the powder, which was very coarse; but I soon found that this was of no sort of consequence as far as the matter in hand was concerned, for, on asking Dsetjuma if he could borrow another gun, he told me that they never used guns here for shooting water-fowl, as, to do so, would be to scare them away, so that, after half-a-dozen shots, there would be nothing more left to shoot at. He then called one of the men, and directed him to fetch something, but I could not understand what; and in two or three minutes the man came back, bringing a bow and a handful of arrows. I examined these, and I found the bow to be exceedingly tough, and that it required a great exertion of strength to draw the bow-string to the shoulder. The arrows were about thirty inches long, made of perfectly straight reeds, tipped with sharp-pointed iron caps. I had no doubt that this would be a very effective weapon in the hands of a person accustomed to its use, but I had no faith in my capabilities of using it with success; however, I had no thought of amusing myself without regard to others, consequently, I gave up the idea of using the gun on the water, and resigned myself to the thought that I must be a spectator of the success of others. We spent a pleasant evening together, which was, however, soon brought to a close by the necessity of going to sleep early, in order that we might be prepared to rise before daybreak. It was still dark when one of the men came in and woke us, and told us it was time to get up. In a minute we were on foot; and there was a general rush to the river, into which we plunged, to the great alarm of a lot of frogs, who were, to all appearance, discussing some grave matter in a general assembly, with as much clamour as if they were pot-house politicians discussing the respective demerits of a liberal or conservative government. After swimming about to our heart's content—(by the way, the first time I saw Japanese swimming, it struck me as being a curious circumstance that they should be able to swim; this may appear rather foolish, but it was so, nevertheless)—we dressed ourselves and went into breakfast—an operation which was soon terminated. We did not all go in the same direction; Dsetjuma and I were taken one way, and the two Japanese another, in order that we might not interfere with each other's sport. When we reached the part of the lake where we were to take water, we found a man already there; he had brought the bows and arrows, and other things which were requisite. There was just a faint indication of daylight, but I could make out no sign of a boat, and I asked when it was coming. Dsetjuma pointed to what appeared a nest of reeds, and, telling me to follow him, he stepped in among them. I followed him, and the moment I did so, I found by the motion that I was no longer on land. We were, in fact, on a raft, having a clear space of about twelve feet in length and eight in width, and surrounded with growing reeds, which were sufficiently thick to hide us from observation, but which did not prevent us from seeing through them. It was formed, as I learnt on inquiry, by trunks of cork trees, on which bundles of reeds were laid, which made a soft mattress, on which we were perfectly comfortable. It was necessary, however, to be guarded in our movements, as there was nothing to prevent us from tumbling into the water if we got too near the edge. Only one man accompanied us, and he stationed himself at what I may call the stem of the raft with a long bamboo pole, with which he urged the raft slowly along. We were not long before we saw a number of ducks, taking an early bath, and, judging by the noise they made, enjoying it very much. They were so thick together, and we were so close, that I thought it was impossible to miss, so, aiming at a big fellow in a line with several others, I let fly an arrow. It missed the one I aimed at, but pierced one of the others, which lay on the water feebly fluttering its wings. Its companions dispersed for an instant as the arrows flew in among them, but, seeing nothing to alarm them, they directly after crowded round their wounded companion, as if to ask why he was conducting himself in such an extraordinary manner. At any rate, whether they were not satisfied with his explanations, or whatever might be the cause, they began to peck him violently, and it was while they were engaged in this unnatural proceeding that Dsetjuma sent an arrow among them, which sacrificed a second victim. They again dispersed, and it was some time before they returned to the spot again; but their curiosity was too strong for some of them, and they again assembled to examine their friends, who floated helplessly on the water. A portion of them, more suspicious than the rest, kept at a distance, and thus escaped for a time, for a second arrow from Dsetjuma, which passed completely through the body of one of them, sent the remainder flying to a more distant part of the lake. The raft was now urged in the direction of the dead birds, which Dsetjuma picked out of the water with a species of fine-pointed lance made of bamboo, tipped with an iron cap, similar to those on the heads of the arrows, but much longer. Two of them were fine, heavy birds, with plumage of a dull muddy colour, and with long bills, broad and rounded at the end. The third was a smaller bird; but it was impossible to make out what it had looked like when it was alive, for its companions had nearly stripped it of its plumage. With the ducks we recovered our arrows, which were thus available for future execution. We continued our course along the edge of the lake, but it was some minutes before we came upon another flock. This time we only secured one, the others fluttering away among the reeds, where we could not have recovered them if we had shot any.

(To be continued.)

* Continued from vol. iii. p. 263.

GUTTA PERCHA.

To the Editor of the "Photographic News."

Sir,—I am quite tired (and I have no doubt so are many more of the readers of your journal) of seeing, week after week, the nonsense sent you by correspondents about gutta percha. They mix their chemicals wrong, then mess them about, out of one thing into another, put in all kinds of things that have no business there, and then if they fail (and I should wonder if they did not) they lay all the blame on the gutta-percha bath or tray, whichever they are using. Now I have been working both positive and negative baths in gutta percha for four years, and can positively state that I have never found the gutta percha affect the bath in the slightest degree. I am working a positive bath now that has been mixed about fourteen months, *and never has been taken out of the gutta-percha bath except to filter*, and I can *now* always rely on getting a good picture, perfectly clear from fog, or any of the other imperfections complained of by your correspondents, *out of this same bath*. I always use gutta-percha trays for all my solutions. I take the negative in a gutta-percha bath; I use gutta-percha varnish for it, excite the paper in a gutta-percha tray, and finish in gold bath in a gutta-percha vessel. I am now taking views and portraits on white silk, and use for the manipulation of that—though so delicate—nothing but gutta-percha articles; therefore, Mr. Editor, I think

you will allow I am competent to give an opinion respecting the good qualities (I have never found any bad) of my much slandered friend, gutta percha. T. Millard.
Stratford.

POSITIVE PRINTING.

When I first replied to your correspondent "R." on this subject, I distinctly stated that it was not to prove his method inferior to that I use, but simply to affirm that there were other roads to good results. It is but natural that no argument whatever should convince any man on such a subject, consequently it would but weary your readers to go any further into this dissertation. With this substantial appeal, I shall close the correspondence. I send you herewith a print, taken some months ago, being one of a great quantity. This "Village Church" was printed upon albumenised paper, 6 grains of salt to the ounce, floated between 5 and 10 minutes on a 50-grain solution of silver, toned with gold and carbonate of soda, according to my statement, and washed about 40 hours.

Will you say whether you think I should improve my results by making any alteration in my mode of working?

I shall only add one statement, viz.: that our greatest chemists affirm positively that albumen is *totally insoluble* when once coagulated (as it is by nitrate of silver), except by one or two tedious and intricate processes. Θ.

[The print is perfect.—Ed.]

Photographic Notes and Queries.

HAS THE VAPOUR FROM PINE ANY DETRIMENTAL EFFECT ON THE NITRATE BATH?

Sir,—Your correspondent "H. R. R." has, I am pleased to say, answered my queries at length in "News," No. 71, p. 226. I hope our controversy, if I may so call it, will be advantageous to your readers. "H. R. R." is still unconvinced. His method of preparing his bath is similar to my own, with this exception:—wanting rather a large bath (about thirty-five ounces), I was undecided of which kind of nitrate of silver to make it, so I determined to use equal quantities of crystallised and fused; this I rather over-iodised, so had to make about eight ounces more, and add it to the stock; this left it in first-rate working order. I have occasionally added an ounce or two of a thirty-five grain solution, according to the use it has had, and am always, as it were, certain of its well working; so much for the bath. The collodion I always use is my own preparation, which, for the general benefit of your readers, I quote:—

Ether, at 4d. per ounce	5	ounces.
Alcohol, at 3d. " . (60° over proof)	2	"
Gun paper	34	grains.
Iodising solution—Alcohol, at 3d. . .	1	ounce.
Iodide potass . .	15	grains.
" cadmium .	15	"

One to seven of collodion. Doubtless many collodion manufacturers will incredulously smile on reading this cheap collodion formula, and doubt its good working properties; but let those who want a first-rate collodion procure the chemicals from a good house—I use Horne and Thornthwaite's—and follow the above recipe. I think the manufacturers will soon find that they are "sold," and their collodions, unhappily for them, not so.

"H. R. R." tries to prove that pine vapour has a deleterious effect on the *nitrate bath*, by bringing forward glass plates as evidence; this I think is *rather* paradoxical, and I must also mention that I never keep cleaned plates in a box without always giving them a polish with the leather immediately before use.

Your correspondent is premature in his conclusions. I think our cases are analogous, for, instead of keeping my bath occasionally in the tent, it is *always* there, rain or fine; furthermore, the solution is never removed from its gutta-percha receptacle, and sometimes stands from a fortnight to a month without being used at all. I have never yet mentioned, that my bath has *not* been coated with shellac, nor has anything been done to render it impregnable.

Were I in "H. R. R.'s" situation, I should remove the pine envelope and substitute some other light-proof material, carefully filter the bath, and then see if the reduction continues; for my part, I shall not be surprised if it does. What *dipper* does "H. R. R." use? Oxoniensis.

TESTS FOR THE PURITY OF CHEMICALS USED IN PHOTOGRAPHY.

Sir,—I shall feel thankful, and I think many others will also who practise the interesting art of photography for amusement or profit, if, through the "Photographic News," you will favour us with the most simple tests of the purity of the various materials used, in order that we may know whether our failures arise from them or our manipulation of them. We purchase of different chemists, on whose respectability we feel we can rely (all of whom assure us their goods may be relied on), and yet, it is to be feared, we often get into a maze and blame ourselves, when, after all, the chemicals are at fault. What is more important than pure water, and perfectly pure crystallised nitrate of silver, and pyrogallic acid, and acetic acid of proper strength, &c., and yet when these things come to hand, often there is a visible difference in appearance, and yet we are forced to believe them (on the credit of the parties) equally good.

I know your great aim is to help; and if you think the above suggestion worthy your attention, I feel you will be conferring a favour upon many subscribers to your interesting and useful publication. G. H. W.

[In accordance with the above request, we propose to give, from time to time, a short account of the properties, preparation, and tests for the purity of the various chemicals used in the photographic art. It will be our aim to render each subject complete in itself; and we think it advisable to secure this object even at the risk of repeating some of the statements which may have previously appeared in these pages. Knowledge does not consist so much in an accumulation of facts, as in the power of obtaining the desired information at the right moment.—Ed.]

TO CORRESPONDENTS.

F. E. G. (*H.M.S. Russell*).—Your inclosure is put into the hands of the police, who will, doubtless, carry out the intentions of Lord Campbell's Act. The view in Falmouth is well executed; but there are several features in one picture, which are not contained in the other. The second picture is weak and indistinct; doubtless, from excess of light. A smaller stop was necessary.

A Subscriber.—Full details of Mr. Maxwell Lyte's meta-gelatine process have been frequently published. You cannot expect much stereoscopic effect in distant objects with a binocular camera. The plates are not kept for sale.

A Professional.—Refer to the index of the volumes already completed. Your question respecting the magic lantern is not clearly stated. Try again.

Diogenes.—There are photographs in the Society's Exhibition now open, that will enable you to judge of the capabilities of Mr. Moule's *Photogen*.

W. M. W. (Tenby).—You had better consult "A Treatise on the Oxymel Process," published by Chapman and Hall. 1856.

R. G., Bembridge.—Received, with thanks. The picture wants only a good sky, to be very charming.

N. Mallow.—Your communication will appear as soon as the designs are engraved.

Z., Folkestone.—At the latter end of March.

F. S. H.—The lens is aplanatic, and can be used, as suggested, for landscapes.

In Type:—B. M. Brackenridge.—W. H. Jennings.

***** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, addressed to the office, should be marked "private."**

SUPPLEMENT TO THE PHOTOGRAPHIC NEWS.

Vol. III., No. 75.—*February* 10, 1860.

THE PHOTOGRAPHIC SOCIETY OF LONDON.—ANNUAL MEETING AND SOIREE.

On Monday evening, the 6th inst., the *soirée* of the Photographic Society was held at the Suffolk-street Gallery. The attendance, which was very numerous, included a larger number of ladies than usual, and the scene was one of great animation. The Right Hon. the Lord Chief Baron Pollock, F.R.S., President of the Society, received the guests. If the visitors experienced any drawback to their gratification, it arose from the absence of photographs from the rooms where they assembled. Delicate ladies, draped in the manner usual at assemblies of this kind, might reasonably feel disinclined to go from Suffolk-street to Pall-mall, for the purpose of inspecting the photographs, especially as the rooms in which they met were hung with paintings. With this exception, nothing could be more agreeable than the proceedings of the evening.

The Annual General Meeting of the Society took place on Tuesday evening, at the Society's rooms, Coventry-street. The Right Hon. the Lord Chief Baron, F.R.S., President, occupied the chair, and there was a large attendance.

The minutes of the last meeting having been read and confirmed,

The President addressed the members. In recapitulating the events of the past year, he alluded to the accession of new members during that period, and congratulated the Society on its flourishing state. He was happy to say that the *Journal* of the Society still maintained a most satisfactory position; and notwithstanding at one time litigation seemed inevitable, touching the assumption of its title, all was now amicably arranged. A bill had been filed in Chancery. His advice was to keep out of Chancery; and to those who were in, he would suggest that they get out as soon as possible. The Council had wisely entertained this view of the case. However high an opinion persons might entertain of the perfection of our laws, when they were actually engaged in law they saw matters in a new light. The Exhibition of Photographs, at No. 5, Pall-mall East, had proved successful, and the number of visitors was much greater than at the Gallery, in Suffolk-street, last year. The collection was highly interesting, and manifested a very considerable advancement in the art. H.R.H. the Prince Consort had visited the Exhibition, and expressed himself highly pleased with the progress that had been made. From the Report prepared by the Council, it would be seen that the rooms at present occupied by the Society were found to be inconvenient and unsuitable, both as regards the locality and the accommodation for the exhibition of photographs. On all occasions except when the Exhibition was held at the Society's own rooms, two years ago, they had been honoured by a visit from Her Majesty or the Prince Consort, but on that occasion they were not so honoured. The members, also, had not availed themselves to the extent anticipated of the advantages of the reading-room and library; but this was not a singular case, as it was found that many of the old-established reading-rooms attached to scientific societies, were seldom frequented except at the time of the meetings for business. The present rooms were too expensive, and in consequence a loss had been incurred of two hundred pounds, to meet which deficiency two hundred pounds' worth of the stock invested in the names of the Council had been sold. The Council had wisely determined to avail themselves of the condition of the lease, and had accordingly given notice of the expiration of their tenancy at the end of the three years, which would be next Midsummer. Meanwhile the Council were looking out for more suitable and less expensive premises. The learned President alluded to the interesting researches of M. Niépce de St. Victor, with regard to the nature and theory of light, and especially the curious phenomenon which had been termed the bottling of light. He regretted that the experiments which had been undertaken in this country by certain gentlemen had not been quite conclusive on this point. He was sorry to find that a distinguished member of the Society was not satisfied as to the correctness of M. Niépce de St. Victor's conclusions. He had great confidence in the observations of that member of the Society; but still he confessed he hoped in this instance he might prove mistaken, as he should like to think that photography was destined eventually to elucidate certain matters which had hitherto remained in doubt as to the nature of light. He hoped that the members of the Society would look beyond the mere taking of pictures, and devote themselves not only to the artistic, but also to the scientific development of photography. He deplored the loss which the Society had sustained during the past year, by the removal of some of its members by death. He would mention Lord Londesborough and Mr. Ross, whose skill as an optician was of world-wide celebrity. He (the President) was sure the members would agree with him in regretting the retirement of Mr. Rosling from the office of treasurer and from the Council, in consequence of that gentleman having gone to reside at Reigate, which would prevent a regular attendance at the meetings. After some further remarks, the President resumed his seat, amidst loud cheers.

The Secretary then read the following

Report of the Council.

The Council of the Photographic Society take leave to submit to the present meeting their Seventh Annual Report.

In making this report they have officially to announce that, in accordance with a general desire on the part of the members, they have determined to relinquish the apartments at present occupied by the Society. The first term of the lease will expire at Midsummer next, and notice has been given to the managers of the Unity Bank that the Society will then terminate their tenancy, according to the provisions of the lease. The Council feel satisfied that in so doing they are consulting the best interests of the Society, being fully convinced, from their own experience, and from the suggestions of other members, that for the annual outlay which is incurred no adequate return is received by the Society.

When the premises now in occupation of the Society were taken, it was thought that the present meeting-room would afford a good locality for the annual exhibition of the Society; but the test of experience has negatived that supposition: not only have the rooms been found too small, and altogether inadequate to the requirements of exhibitors, but the site has also been found to be objectionable.

After the Council had become convinced of the inconvenience of the house for the purposes of an exhibition, they did their utmost to make the rooms agreeable and useful to the members, at other times than those for which they have sought the patronage of the public; thinking thereby that possibly a considerable number of new members might be induced to join the Society from the advantages held out. They therefore instructed the secretary to take steps for rendering the rooms more generally useful, and considerable personal exertion was made to attract the members to the reading-room. In the 71st Number of the *Photographic*

Journal an appeal was made to the amateurs and professors of photography in the following words:—

"The Council of the Photographic Society desire to draw the attention of Members of the Society to the fact that their rooms in New Coventry-street are at their service for all purposes connected with the progress and recognition of the heliographic art, and of diurnal communication among its disciples. These rooms are in the centre of London; they are visited, or *may* be visited, by all students of Photography; they are supplied with the leading public journals of letters, science, and art, and are rich in the current accounts of photographic discovery and adaptation.

"A photographic library is also in progress of formation, and is becoming more and more important. These apartments are open every day in the week to members of the Society. On the walls will generally be found the works of those earnest followers of the art who desire to consult their brethren on points interesting to all. The Council desire to place these rooms still more completely at the disposition of the members, so as to promote a yet more fruitful and effective intercourse among them; they will therefore be particularly pleased to offer every facility to those gentlemen who may wish to exhibit works showing new discoveries in the art, or new modes of application in the resources already known."

No sufficient response was made to this appeal to warrant the Council in believing that the attempt had been successful in the degree that they had hoped, and which would have justified them in retaining the rooms for these useful but secondary purposes. It seems doubtful whether, upon an average, a single person per week has frequented these apartments. Non-use of the reading-room of a literary society is not the case with photographers alone; it appears that the libraries and reading-rooms of some of our oldest, most useful, and venerated societies, enjoying a far larger number of active members than our own institution, are scarcely ever visited except at the time of the ordinary meetings of the members.

The expense of the house, exceeding 300*l*. per annum, has been a heavy demand upon the funds of the Society; and as the annual subscription of its Members is only one guinea per annum, these rooms have entailed a considerable loss, and the consequence is, that the balance sheet this evening exhibits a less favourable aspect than would otherwise have been the case.

In order to clear off payments which should have been made in former years, there has been a necessity to sell 200*l*. worth of the stock invested in the bank in the names of the trustees. At the same time, however, the Council desire to point out to the Members that the current expenses of the Society do not exceed its income.

The members of the present Council, aided by those gentlemen elected at this meeting, will use their best exertions to secure a locality for the Society at least as agreeable and less expensive than the present one. Any suggestions addressed to them from individual members will be thankfully received and considered in the interests of the Society.

The differences which existed at the commencement of the present year, as to the title of the Society's Journal, have been satisfactorily and amicably arranged; and it is gratifying to state that the Journal continues to be highly remunerative.

During the year there has been a large increase of new Members, upwards of forty having been elected; thus proving beyond dispute the interest which the photographic art still excites among artists and men of science.

It was announced at the last annual meeting that each Member might expect to receive a copy of some photographic work approved by the Council. After that announcement was made, several gentlemen kindly offered to contribute fifty prints each of their own production. Some of these specimens of art-productions have been received, and it is intended that a distribution shall take place at an early meeting of the Society during the present year.

There has been no great or startling discovery to chronicle during the past year: yet a steady progress has been made in the practice of the heliographic art. It may be safely affirmed that the walls of the Exhibition now open show a greater number of truly good pictures, than has ever appeared at one time on any former occasion.

The chemical examination and practical use of collodion have occupied the attention of a Committee of members of the Society, and it is believed that the Report which is presented this evening will enable photographers to pursue their operations with greater confidence than they have hitherto done.

The sanguine hopes which were entertained of the successful application of carbon as a permanent printing process, seem in a fair way to be realised, as will be proved by the issue, with the next number of the Journal, of a print given by Mr. Joubert, which promises perfect durability, with great facility of reproduction.

The officers of your Society who vacate their functions this evening leave their acts to your consideration, and offer themselves, in accordance with the law, for re-election. The Council have only to add that during the year they regret to have lost the valuable services of your late Treasurer, Mr. Rosling, whose removal to Reigate has rendered constant attendance at the meetings of the Council inconvenient. His place has been temporarily but most ably filled by Mr. Hamilton, who has on many occasions rendered good service to the Photographic Society as auditor of the accounts, and who now places his commission in your hands for renewal.

On the motion of Mr. Shadbolt, a vote of thanks was unanimously accorded to Mr. Rosling for the very able manner in which he had discharged the duties of Treasurer of the Society.

Mr. Kilburn apologised for being out of order, but rose to complain that certain coloured photographs which were exhibited by a photographic artist, whose name he gave, at the Gallery, at Pall-mall, had been coloured by artists in his (Mr. Kilburn's) employ, and to whom he paid very large salaries. The discovery had been made too late to request that the Council would withdraw them.

Mr. Crace thought the subject could not be entertained by the Council. The exhibition was opened for photographs only; or where coloured pictures were admitted, they were to be accompanied by a similar untouched photograph. However great an injustice had been done to Mr. Kilburn, it was not a proper subject to be discussed by the present meeting.

Mr. Kilburn said he was content with merely bringing the matter before the Society.

The President, referring to the statement of accounts which he held in his hand, said that it should be read if any of the members so desired. The balance sheet would be duly published, and would also lie on the table of the Society's rooms, and might be consulted by any who should so wish. Nothing was so tedious, uninteresting, and uninstructive as a statement of figures; every one admitted that a bill was a most disagreeable thing; however, there was a Dr. and Cr. account for those who may wish to consult it.

The President then drew the attention of the meeting to the Report of the Collodion Committee, a copy of which had been sent to most of the members, and which would be published in the next Journal.

Mr. V. Heath said that a Report of so much importance, and involving a subject so difficult as collodion, ought not to be adopted by the Society without great caution; he therefore moved that the publication of the Report be deferred, and that at the next ordinary meeting of the Society the subject should be discussed. No seconder coming forward,

The President suggested that the Report be printed, and circulated among the members, and that it be considered and discussed at the next meeting in March.

This suggestion seemed to meet with the approbation of all present, and was agreed to, Mr. Heath bowing to the opinion of the learned President; it being understood in the meantime, that the report should be regarded as the opinions of the gentlemen signing it, and only on the specimen of collodion which had been submitted to them.

Messrs. Shadbolt and Kilburn were appointed scrutineers, and the following officers were declared to be duly elected:—

President:—Sir F. Pollock, F.R.S., Lord Chief Baron.

Vice-President:—C. B. Vignoles, Esq., F.R.S.

Treasurer:—Arthur R. Hamilton, Esq.

Secretary:—Hugh W. Diamond, M.D.

New Members of Council:—Professor Philip Delamotte, Joseph Durham, Esq., F.S.A., Arthur Farre, Esq., M.D. F.R.S., J. Dillwyn Llewellyn, Esq., F.R.S., Professor Wheatstone, F.R.S.

Several new members were elected, among whom were:—Warren De La Rue, Esq., F.R.S., Charles Ruland, Esq., and H. Claudet, Esq.

The proceedings then terminated.

The Report of the Collodion Committee, alluded to at the meeting, is subjoined:—

REPORT OF THE COLLODION COMMITTEE.

In March, 1859, the Photographic Society appointed a Committee to examine samples of photographic collodion, and report upon them, with a view of arriving at a definite formula. Advertisements were issued, which were replied to by Messrs. Hardwich, Mayall, and Sutton; but the two latter of these gentlemen did not send in collodion in sufficient quantity to admit of its being thoroughly tested. Hence, although individual members have worked with the collodions of Mr. Mayall and Mr. Sutton, the Committee in its collective capacity can only pronounce upon that prepared for them by Mr. Hardwich. They trust, however, that the investigation which they have undertaken will not be suffered

to end with one Report, but that other makers of collodion will come forward and assist the Society in the determination of this difficult but important question.

In proposing to themselves a scheme for the general conduct of their operations, your Committee did not think it advisable to place too much reliance upon experiments made in concert, since these must necessarily have been few and imperfect. It appeared to them better to allow the members to work separately, and afterwards to collect and compare their individual reports. Nearly a year has now elapsed since the Committee was formed, and it cannot therefore be objected that its conclusions have been hastily drawn; neither can it be said that the Report has been made without a full and impartial examination, for the names of no less than twelve members are appended, who are known to the Society to practise every branch of the art. Portraiture, both in the studio and in the open air, landscape scenery, architecture, copying, and sculpture, have all been represented in this investigation, and the lenses employed, and plates covered, have been of every conceivable size. Further, as the various members of the Committee differ in their views of the best modes of iodising photographic collodion, opportunity has been afforded of comparing the results obtained by each method, and of drawing conclusions therefrom.

This Report, professing to deal with the practical working of negative collodion, may be naturally divided into two parts, for the experience of members of the Committee using simple iodides does not admit of comparison with that of others employing in preference iodide and bromide conjoined. There is, however, one ground common to both, viz., the *mechanical properties* of the collodion under examination, and of these we proceed to speak.

The Committee are unanimous in thinking that the collodion which Mr. Hardwich has sent in to them is comparatively, if not entirely, free from glutinosity, crapy lines, contractility, and other defects of the film, which were very commonly met with some years back, when the manufacture of collodion was first commenced. The reports of Messrs. Delamotte and Fenton are the most valuable on this head, since they have worked on glasses of a large size, viz., 24 inches by 18, and 18 by 15. Their experience is, that although the collodion sometimes contains too much soluble cotton for these large plates, and occasionally requires thinning down with ether and alcohol in very hot weather, yet that the pyroxyline is nearly of the right kind as regards flowing properties, and may with justice be said to be well calculated to support a smooth and even layer of iodide, without any woolliness or ridges.

Another matter which falls under this same head of mechanical properties is the tenacity of the film, and its adhesion to the glass. We are satisfied that the collodion submitted to us is sufficiently tough to bear a reasonable application of water, either from a tap or a jug, without tearing, and that, with ordinary care in manipulating, it will not fall away from the glass. No member of the Committee, as far as can be gathered from their separate reports, has been compelled to grind the surface of the glass at the edge to prevent splitting, or curling off on drying. Mr. Fenton, indeed, states that on using some of the earlier samples of collodion supplied to him by Mr. Hardwich, he was obliged to roughen his largest plates, but that with the collodion which he received during the past summer and autumn he did not find it necessary to take this precaution.

The Report being satisfactory on the points above mentioned, we next considered the quality of the film yielded by the collodion, as regards closeness or openness of texture, and here it is found that some members speak of it as being too horny. That the film does possess such a structure is certain, and hence the question of how far this must be considered a defect. The following are extracts from the Reports of those members who make complaint. Mr. Bedford says—"One fault I have found is a too quick drying of the film in hot weather. If, as is frequently the case, the plate has to be kept over fifteen minutes or so, it is necessary to add alcohol to the developer to prevent stains and patches of unequal development." Mr. Hughes also observes—"My dark room being small, and with a southern exposure, becomes almost like an oven in hot weather, and one of the principal difficulties which I encountered was the partial drying of the film whilst it was in the camera slide." The attention of the other members of the Committee was particularly directed towards this horny quality of the film, but, with the exception of Mr. Morgan, who speaks of it as inconvenient, but not insuperable, they make no allusion to it in their replies.

Passing next to the consideration of the photographic properties of the collodion, we find it necessary, as before said, to distinguish between the results obtained by simple iodides and those from iodide and bromide in mixture. To begin with the former, there are embodied in this Report the observations of nine or ten members who have worked either with iodide of potassium, as an iodiser, or with iodide of cadmium. The following is an epitome of their conclusions:—

First, with regard to the sensitiveness of the collodion, the opinion of the majority is, that it is unsurpassed. Mr. Delamotte, who has worked in the subdued light of the Crystal Palace, at Sydenham, with lenses of very considerable focal length, speaks confidently on his point; and Messrs. Bedford, Hughes, Robinson, Sedgfield, and Williams, are of the same opinion. Mr. Frith also, in a letter dated Cairo, August 1st, 1859, says:—"I find this collodion exceedingly rapid. Three days after iodising (potassium iodising solution), it will take a picture with the smallest aperture of the landscape lens (15 inch focus) in five seconds; and I have some hope of getting an interesting series of instantaneous pictures, by using a stop of 1½ inches diameter on the portrait lens (3¼ inches diameter). The lens then covers a 4½ inches plate, with tolerable depth of focus, and I can obtain a sufficiently developed picture with an absolutely instantaneous exposure, sailing boats with the ropes sharp, moving figures, &c." Under date of the 7th of August, he adds:—"We have just returned, after having spent five days in the mud house of an artist at the Pyramids, where we were devoured by thousands of sand-flies; the water very bad, and the heat great. I worked hard, and took some fine pictures. Nothing can be more satisfactory than the performance of the collodion. I still get landscapes with the smallest aperture of the view lens in four seconds, and have taken capital pictures in the heat of the day. I should imagine the temperature in my little tent could not be less than 130° Fahrenheit; the developing solution was quite hot.*

Mr. J. Morgan of Bristol, in the report which he has forwarded, does not coincide with the above statement, for he says:—"I am able to obtain a similar negative with another collodion in one-half of the time." This discrepancy is the more remarkable, because the nitrate bath in each case was made out of pure nitrate of silver crystallised purposely for the Committee. The developer, however, which Mr. Morgan employs contains less than the usual proportion of pyrogallic acid, and he sometimes, but not invariably, adds a small portion of citric acid.

When iodide of potassium is employed as the iodiser, the collodion loses its sensitiveness very considerably after a time, but the members of the Committee are not agreed as to how long it will keep in good working condition. Mr. Bedford says: "I prefer using it newly iodised, say in about two days; after five or six days it loses sensitiveness, and deteriorates rapidly, but in this state it works well enough when time of exposure is no object. I kept it in even working order by adding some freshly-iodised collodion to the stock-bottle daily." Mr. Delamotte writes: "I found, whilst working in the Crystal Palace, that it lost a good deal of its sensitiveness in three or four days, and in offering a suggestion for the improvement of this collodion I would say, that if possible, it be made to retain its sensitiveness longer, with the same qualities it now possesses in other respects." Mr. Morgan says, in reference to its keeping qualities: "A day or two after iodising is the best time. I have taken a landscape picture with it after a month, but I do not think it improves by keeping as long as that." Mr. Robinson reports: "It gives good results for portraits if used immediately after iodising, but I prefer it when it has been kept two or three days, or for landscapes two or three weeks." Mr. Sedgfield, giving his experience in stereoscopic photography, writes:—"I cannot say much as to its keeping qualities, as I seldom have any by me more than a week old." Lastly, we have the report of Mr. T. R. Williams, who, working in a London studio, necessarily requires the maximum of sensitiveness. He considers that the collodion does not alter much during three or four days, but that afterwards it becomes useless for the purpose which he requires.—The foregoing observations apply to the summer season of the year, and not to the colder months, during which the deterioration in sensitiveness is less rapid: Mr. Williams has lately obtained good pictures after a fortnight's keeping.

We next examine the collodion with regard to the quality of the negative which it yields, and in this respect we are able to pronounce upon it favourably. The image is very sharply defined, and the development can be pushed to an extent sufficient to bring out the deepest shadows without adding too much to the opacity of the high lights. The printing qualities of the negative are good, and those parts of the film which are protected from light remain free from fogging. The liability to staining and marks of all kinds in hot weather is not great, as attested by Messrs. Delamotte, Morgan, and others, who state that the collodion gives a clean and bright picture.

In drawing up a report in which gradation of tone in a photograph is spoken of, it must always be borne in mind that the character of the light and the aperture of the lens have much to do with the hardness or softness of the picture; and this observation we find corroborated in the separate reports sent in to us, for whilst one or two members have found at times a difficulty in obtaining sufficient contrast, others have complained of excess of intensity, although both were working with the same description of bath. Mr. Bedford alludes to this, and says: "In a strong light or glare of sunshine, there is, I think, a tendency to too great density, a too rapid starting out of the image. This I have remedied by employing a weaker developer, and, in some cases, by washing the free nitrate away from the plate before putting it on, or washing the plate once or twice during the development, using, in that case,

* It is only fair to state that the above favourable opinion from Mr. Frith was extracted from private letters written without any idea that they would be included in this Report.

silver to give force to the image. By this means I avoided hardness, and secured a good picture under trying circumstances of light and heat." Allowing for these differences in intensity, which must occur with any collodion, we find that the preparation which we have examined is sufficiently good, and that it is not a collodion of that kind which requires a considerable addition of nitrate of silver to the developer, or fails to yield an intense picture unless acetate be added to the bath. As a rule, the image will attain its maximum density shortly after the pyrogallic acid is applied, and there will be a fair share of the characteristic drab or cream colour upon its surface.

Whilst speaking of gradation of tone, it may also be remarked that different developers have been employed by the Committee to assist in securing the correct amount of contrast under varying conditions of light and temperature. Thus Mr. Delamotte, working in the Crystal Palace, at rather a low temperature, has developed plates of the stereoscopic size by preference with sulphate of iron, and Messrs. Robinson and T. R. Williams have occasionally used the same reducing agent for portraits. The intensity of the negative taken with sulphate of iron is often sufficient, but if not so, the development is completed with pyrogallic acid and nitrate of silver.

One question put to the individual members of the Committee was the following: "Have you found the collodion to injure the bath by long use?" The reply is in the negative, and this we consider of importance, because we have on other occasions worked with collodions which had a decided effect in throwing the bath out of order. The Committee, as a body, pronounces no opinion on the cause of this, but certain individual members attribute it to the employment of methylated spirits, in place of the pure ether and alcohol which are used by Mr. Hardwich.

The seventh question in the suggestions on the order to be observed in drawing up the reports, was as follows: "What do you consider the principal defects in the collodion?" Mr. Hughes complains of transparent spots with tails, taking the direction of the draining, and showing most distinctly when the collodion was newly iodised; by using bromo-iodide instead of simple iodide, and developing with sulphate of iron, the spots almost invariably disappeared. Two or three of the members speak of narrow black lines like threads in the direction of the dip; these same lines being sometimes, but not invariably, remedied by rocking the plate laterally immediately after putting it into the bath.

Under the head of Question 9, viz., "State anything which has occurred to you in the course of your experiments likely to forward this investigation," we have the following suggestions from Mr. Russell Sedgfield: "A collodion iodised with *cadmium* only is very useful in extreme cases, such as dark glens, &c., and I always carry a little with me on my excursions. At present my decision is in favour of a pure potassium iodiser, with some cadmium collodion carried separately for use on occasion, either by itself, or, perhaps preferably, mixed. The mixture of the two seems the best for the majority of amateurs, who cannot be expected to go into detail in these matters, and whose consumption is small and irregular. When iodised it certainly keeps much better than it would with potassium alone, and I have just been taking, to satisfy myself, some excellent portraits and views with remnants from my last journey, iodised three months ago." This plan of mixing together collodions possessing opposite properties has been successfully adopted by several members of the Committee, when they have satisfied themselves as to the working qualities of each collodion by using them apart.

Mr. T. R. Williams was supplied with cadmium collodion from the Committee, in addition to the same plain collodion iodised with potassium; he remarks upon it as follows:—"I have found the cadmium collodion to give the softer image of the two, but they are both good, and some of my best portraits have been taken with them. By using sometimes pyrogallic acid, and sometimes sulphate of iron, and occasionally both on the same plate, it is possible to obtain either a soft, delicate effect, or a bold and hard picture. The cadmium collodion does not appear to deteriorate by keeping in the iodised state."

Included under this same head of "Suggestions for Improvement," &c., we give the following, also from the pen of Mr. Sedgfield:—"Lately, when taking interiors, I have adopted a suggestion of Mr. Sutton's, by adding strong alcohol and soluble cotton, with a little more iodide, to the samples of collodion which I have by me, in order to get a pappy film capable of retaining its moisture longer than the ethereal and skinny mixtures. My experience of this kind of work has been so far satisfactory that next season I shall carry the plan out more regularly, although I cannot say whether such a collodion is equally suited for use on all occasions."

Having now concluded the first division of our report, viz., that which refers to the collodion prepared with simple iodides, we pass on to the second, in which is given the experience of those members of the Committee who have worked with iodide and bromide conjoined.

Mr. Fenton has used collodion sent to him from the Committee in the regular course of his photographic practice during the past year, and has been at some pains to ascertain in what manner it ought to be iodised in order to secure the best results. His lenses have been almost entirely single ones, and of every variety of focus; the character of work—landscape and architecture, with occasional interiors, and copies of drawings and sculpture. His experience is as follows:—"The collodion prepared with iodide of potassium only ought not to be entirely rejected; it is useful on occasion, being sufficiently sensitive, and producing, for some purposes, a good quality of picture. It has, however, formidable drawbacks, such as soon becoming red and insensitive, and being liable to show white spots often when used alone, but still more frequently when added to any other collodion." On the whole he gives preference to a mixture of iodide and bromide, which not only produces a far more stable collodion, but represents the colours of landscape scenery in a truer gradation, and brings out the sky and the foreground of the picture at the same time without solarising.

With reference to the salts which should be employed, Mr. Fenton has worked with a collodion prepared by Mr. Mayall, containing iodide and bromide of magnesium, and also with one made by Mr. Hardwich with the same compounds. The two collodions, however, did not agree in properties, for whereas the former was rather glutinous, and gave a fair share of intensity, the latter was limpid, and produced a weak negative. By mixing them together a good working collodion was obtained, with which some of the views of Oxford now in the Exhibition were taken. He is not inclined, however, to recommend the use of the iodide and bromide of magnesium.

During the months of August and September, Mr. Fenton worked with plain collodion similar to that sent to the other members of the Committee, but iodised with iodide and bromide of ammonium and cadmium dissolved in the usual proportion of alcohol. It is extremely sensitive, and takes the dark parts of the picture well, but should be kept for some days after iodising, or there will be occasional white spots and lines on the image. This collodion improves by keeping even for many weeks, and is so far good, but it is difficult to use it for landscape work in hot weather, because the least over-exposure destroys the intensity, and makes the picture flat and thin. A solution of sulphate of iron was used to develop, with mixed pyrogallic acid and nitrate of silver as an intensifier.

Mr. Hughes is an advocate for the employment of iodide and bromide conjointly in portrait collodion, and the reasons which he alleges are these:—"Although with simple iodide a picture of superlative excellence may be taken by a skilful operator, yet, to the amateur who desires only a good average result, with little liability to failure, bromide is an assistance. I would direct the attention of the Committee to this point."

Mr. J. Spencer communicates an account of some experiments which he has made during the preceding season with bromo-iodised collodion sent to him from the Committee. It appeared to him to be very valuable for some kinds of landscape work, and at the season of the year when the light is strong. In the winter, however, he works by preference with a simply iodised collodion containing only iodide of cadmium. As regards the proper developer to employ with bromo-iodised collodion, he commenced his experiments with sulphate of iron, but as the heat became greater, he found pyrogallic acid to be sufficient.

In order to render the above observations complete, we require exact experiments on the comparative sensitiveness of the simply iodised and bromo-iodised collodion. These have not at present been made, and so far the Report is incomplete. Without doubt, however, the latter retains its properties very much longer after iodising, and has the merit of producing delicate half tones, whilst a sufficient intensity can in most instances be obtained by carrying on the developing action with pyrogallic acid and nitrate of silver.

Mr. Thurston Thompson, a member of the Committee, works exclusively with the bromo-iodide. All the pictures which he has exhibited were taken with a collodion of his own manufacture, and he was unable during the last season to give such careful attention to the collodion sent to him, as would justify him in speaking confidently of its merits.

The names of other gentlemen, members of the Committee, viz., Mr. Llewelyn, Mr. Maskelyne, Mr. Mayall, Count de Montizon, Mr. Spiller, and Mr. White, will not appear in this Report from the same reason.

Mr. Malone, on whom devolved the task of examining the formulæ as regards their chemical aspect, has expressed his full satisfaction with that by which the collodion sent to the Committee by Mr. Hardwich was prepared. He has assisted at the manufacture of the pyroxyline and collodion, not in small quantities, but on a commercial scale, and has received a complete list of details and precautions which are necessary in order to insure success.

In concluding this Report, the Committee have much pleasure in expressing their opinion of the superior excellence of the collodion submitted to them by Mr. Hardwich, and they can confidently recommend the Society to stamp the same with the full mark of its approbation.

F. Bedford.	J. H. Morgan.
P. Delamotte.	H. P. Robinson.
Hugh W. Diamond.	Alfred Rosling.
Roger Fenton.	W. Russell Sedgfield.
C. J. Hughes.	J. Spencer.
T. A. Malone.	T. R. Williams.

THE PHOTOGRAPHIC NEWS.

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ON COMPOSITION AND CHIAR'OSCURO.—I.

BY MR. LAKE PRICE.

"*Ars longa, vita brevis est.*"

"As our art is not a divine *gift*, so neither is it a mechanical *trade*. Its foundations are laid in solid science; and practice, though essential to perfection, can never attain that to which it aims, unless it works under the direction of principle."—Sir Joshua Reynolds.

A correct appreciation of the beautiful in nature is much more rare in mankind in general than might be imagined; both the eye and the mind require to be attuned and educated in order that we may be impressed with a due sense of the countless beauties which present themselves to our vision, and which are passed by wholly unnoticed by those who are ignorant of artistic pursuits. Nor is such blindness by any means confined to the uneducated classes; for we seldom find, even amongst those of high mental acquirements, such a sense of the beautiful that they can perceive and enjoy its influence.* This, of course, is to be lamented, since they are thus deprived of the exquisite enjoyment which the appreciation of the most ordinary objects in nature affords the mind tutored to the habit of artistic observation. To such a mind, not a passing cloud—not a gleam of sunshine—is lost; the humblest weed has an interest; the colour of the smallest lichen or moss is a study; the calm and the tempest, the dazzle of mid-day or the stillness of twilight, is replete with interest. The uninitiated in art pass, in a listless manner, through the finest scenery in the world, or yawn as they look on the masterpieces of genius in the galleries of Europe, entirely for want of the key to unlock the, to them, hidden treasures—only too happy when the self-imposed task is finished, and that they can mark it down in their diaries as "done." Knowing so little about the matter, they often resolve to ignore the thing *in toto*. "Sir," said a warm-looking old gentleman, walking up to the writer when sketching in Pompeii, "I do hope there are no pictures here! for my wife has taken me all over the galleries at Rome till I can't bear the sight of them;" or as a prominent member of a photographic council declared, "that he did not see what was wanted with pictures; he thought the science of photography would be just as well without them."

That the feeling of the beautiful and appropriate in art should be obtuse amongst the masses of our population is not wonderful; as has been said, to appreciate its charms, requires an aptitude which only comes by observation and comparison of images of refinement. Whence can we possibly imagine that the artisan should derive his inspirations, who passes his monotonous existence in a muddy atmosphere, surrounded by square masses of dingy brickwork, relieved by the smoking stalks of factory chimneys; can we be surprised that art blindness exists largely in a population having so little contact with it? Contrast the lowest orders in Italy, who will call your attention to a passing effect of light—"*che fa tanto bene, Signor*"—or take you to see a bit of the picturesque, with the consummate tact of *virtuosi*. The reason is evident. Rome, Florence, Venice, &c., are Museums of Art; their very streets are adorned with the works of Michael Angelo, Donatello, Cellini, &c. &c., which from the cradle have been familiar *lares* to their eyes. Art has stored up her choicest treasures in the overflowing museums, each succeeding generation* has contributed to the decoration of the churches and palaces, replete with statues, bronzes, frescoes, and pictures, enshrined in the most precious marbles, and of facile access to all.

The extraordinary development of photography has been of great advantage in preparing a remedy for these deficiencies. Thousands, without any knowledge of or interest in art, and who, as adults, could not afford the leisure necessary to cultivate drawing and painting, are possessed of a camera; by its means they are becoming gradually but surely conversant with the delineation of objects, are acquiring habits of observation of the beauties of nature and art, and are noting those appearances and effects which produce an agreeable impression on the mind. Still, for want of some knowledge of the general principles of composition, and light and shade, their energies are frequently misdirected; there consequently is a vast amount of camera power running to waste throughout the country, and ill-natured remarks are rife on the crudity of the productions often exhibited with a complacent air. It is true that the fatal facility of the camera does instanter furnish its recent possessor with that image of an object with which he as quickly dazzles the eyes of his acquaintance, but his ambition should not rest here; thoughtful selection, completion, artistic arrangement, should succeed these first efforts. Nor will the camera be found an ungrateful instrument; on the contrary, it is quite certain that the quality of picture produced by it will be as varied as the minds of the operators, and that vulgar and ignorant treatment, or taste and knowledge, will be apparent in the picture, according as the mind of the producer was more or less conversant with the principles of art.

The works of the late Mr. Grundy were examples of what could be effected by an amateur who took up the camera with the true feeling; his pictures evinced qualities which would have been creditable to any artist, and they, accordingly, were inspected at the *conversaziones*, by the most talented men of the day, with lively interest and approbation. There are other artists, still living, whose well-directed labour gives encouragement to their brethren of the camera; and, doubtless, many only require their studies to be pursued in the right direction to enable them to produce pictures which shall be satisfactory to themselves, and, in an inconceivable variety of directions, interesting and instructive to society.

To facilitate these studies, we will first proceed to give a concise sketch of the rise and progress of pictorial art, and the nature of its practice by the various schools of Europe. Next we will show what are the obvious faults to be avoided, beginning even with the most elementary; we will then proceed to lay before our readers examples selected from the works of the greatest painters and sculptors, in illustration of the excellencies to be appreciated in correct linear composition, and judicious light and shade, and, as far as possible, and where most necessary, we will illustrate the meaning of the text by wood cuts.

Of the art of the ancients, little has escaped the ravages of time, save the statues, bassi relievi, and bronzes of their sculptors. It is not probable that the people who had constantly before their eyes the wondrous sculptures of the Parthenon, or those collected by the Roman emperors in the

* Prince Hoare says, "that even scholars, of the profoundest erudition in letters, are very commonly little better informed of the properties of art than the merest school-boy at an academy."

* For nearly three centuries the members of six or seven families, from father to son, worked on the mosaics in Pietra dura, the Intarsias and marble arabesques and sculptures, &c., of the Certosa of Pavia.

Forum, baths, and temples of ancient Rome, could have tolerated in the works of their painters any mediocrity in their delineations; but all that have descended to us have been the productions of men—a superior class of whom we should rather term the *decorators* than the *artists* of antiquity; bearing to the latter no greater analogy than the individuals who, living during the great era of art, the Cinque Cento, and having under their eyes the masterpieces then in process of execution, painted in emulation on the Majolica of Faeza and Gubbio the designs and ornaments which have rendered them celebrated. Of their labours, the paintings on the walls of the apartments at Pompeii, and some arabesques in the baths at Rome, are all that have descended to our time. The first were undiscovered till the last century; and although of the latter few are the vestiges which remain, even these were considered by Raffaelle of such merit, that he either copied them himself, or caused them to be copied by his disciples; and these sparse relics of antique art, buried for centuries beneath the crumbled ruins of the palaces of the Cæsars, were brought from their subterranean darkness, to stamp their model on the embellishments of the Loggie of the Vatican, to be imitated on the sumptuous halls of the Gonzagas at Mantua, and to leave their impress on decorative art throughout Italy.

Of antique art in the shape of sculpture, sufficient has escaped destruction to show us of what human genius, in its greatest state of perfection, is capable, and to contribute largely ever since the revival of the arts in 1400—1500, to excite emulation, and serve as models for the study of the greatest artists who have since appeared. The very ravages of time seem reluctantly to efface their grand outlines. The Theseus of Phidias, mutilated as it is, sits in godlike majesty, as though calmly defying the destroyer. Look at the Dying Gladiator: here was but commonplace material, if treated by an ordinary artist. A barbarian captive, his coarse hair matted on his brow, his countenance deficient in beauty, what does he become under the touch of genius?—a poetic monument, full of pathos and intense feeling, which pervades the lifeless marble.

These, and such works as these, contributed to form the giants in art of 1500, who constantly referred to them as models for imitation. Sustained in their labours by the fostering patronage of popes, of senates, and princes, who thoroughly appreciated their works, and encouraged by the keenly art-sensitive peoples of the various cities of Italy, the heroes of the *renaissance* regenerated pictorial art.

(*To be continued.*)

THE PHOTOGRAPHIC EXHIBITION.

THIRD NOTICE.

It would be difficult to decide which prints are most attractive, those by Fenton, or those by Bedford. Fenton's pictures have the advantage as regards size, but those by Bedford represent such beautiful scenes, and have a tone so peculiarly rich, that it is with renewed pleasure one returns to look at them. At all events, it is certain that without the prints contributed by these artists, the Exhibition would have made a comparatively poor appearance; not that there are no good prints beside theirs, but not a sufficient number to have formed an Exhibition worthy of the name. Beside these, Mr. Maxwell Lyte and M. Bisson are very liberal contributors, and their pictures possess a peculiar charm. We shall refer to them in detail as we advance in our review.

The print representing "Flaxtole Schools" is very good. But there is nothing in the architecture to give it interest, and we are not aware that there are any associations connected with these schools which supply the deficiency. Lieut.-Colonel Holder is rather unfortunate as respects the positions in which his contributions are hung. In the frame containing his "Views of the Ruins of Cowdray Castle," the two upper prints were beyond the reach of a close examination, and his views of "Midhurst" and "Midhurst Wharf" are in the same predicament. Their appearance presents a striking difference as regards colour and execution. The view of "Midhurst" is disagreeably dark, the shadows have a black, inky aspect, which overpowers the lighter tones of the picture, and it is not a favourable specimen of the photographer's skill in other respects. The view of "Midhurst Wharf" is far better, both in respect to colour and manipulation.

The view of the "Seeta Pahar Cutting, Rajmahal," represents a portion of the East Indian Railway. The scene is a grand one, and would have been rendered more effectively if it had been taken with a larger instrument. The navvies are well posed, and the presence of a number of natives at the top of the cutting, in positions which seem to indicate great thoughtlessness or supreme indifference to the risk of being smashed, heightens the interest of the scene. It is a very good print, in spite of some trifling defects. On looking at the sky, we perceive that two comets are reproduced with great success. From the cleanness and detail evident in this print, we draw a confirmation of the opinion we have more than once expressed, that the collodio-albumen process is better adapted for a hot climate then the wet-collodion. Contrasting strongly with the above is a print of the "Memorial Church," built by the Misses Reid, which hangs immediately below it. At first sight the peculiar style of architecture led us to imagine that it was a picture of a church in India, contributed by the same artist; but a reference to the catalogue shows us that it is a church in Buckinghamshire, by Vernon Heath. The print is sharp, and is not without merit; but the subject is not one to attract much attention.

Two views of Cheddar Cliffs, by J. Wellings, appear to be the best pictures which this artist sends to the Exhibition. The prints are interesting, and exhibit good detail and half-tone. At this part of the room we come upon several of Mr. Maxwell Lyte's pictures, which are easily recognised without the necessity of looking at the catalogue. The first in order, "Le Pont de Betharram," is a very nice print. It represents a bridge from which creeping plants hang in heavy masses. The water is well rendered, and there is an air of quiet over the scene which heightens its attractiveness. The view of "Gèdre" is also a fine picture; the gradation of tone is beautiful, nothing could surpass the manner in which the lights and shadows are rendered; the minutest details are visible throughout the picture, as well in the mountains which form the background as in the objects occupying the foreground. "Le Pont du Roi" is not so much to our taste; it appears rather hazy, and is, besides, not a subject which is suited to develop the peculiar beauties which characterise Mr. Lyte's pictures, of which No. 181 offers an excellent example, but which is surpassed by a charming view of "Bagnères de Bigorre." This is about the best of his pictures, and there is not another in the Exhibition which surpasses it in the clear and delicate rendering of all the details. The foliage is excellent, and the eye travels from point to point until it reaches the mountains which shut in the view without having met with a single defect. The sides of the mountains themselves, distant as they are, exhibit the most delicate gradation of tone.

"The Abbey Gate," at Bury St. Edmund's, by J. Dixon Piper, is imposing from its dimensions, and stands out from among those which surround it with great distinctness. The gate is very good; but it has the appearance of standing in a lake—a defect which we perceive to exist in his view of the "Norman Tower." This also is a large photograph, and the manipulation is very good, but the appearance is not agreeable to the eye, it seems to be so much out of the perpendicular. The choice of the point of view from which it was taken is not the best, as we have the means of judging from a print, by Cundall and Downes, of the same tower, which is far better as a picture, and in which the structure is no longer a "leaning tower." We think Mr. Piper would

have acted wisely if he had sent more of such prints as that of "A Cottage near Ipswich." This is a bright, cheerful-looking picture of a cottage, and a road shaded by trees. An appearance of life is given to an otherwise quiet spot by the presence, in the foreground, of a passing timber carriage.

The appearance of the "View on the Wharfe," by W. Sykes Ward, does not induce us to modify our opinion on the subject of his modification of the collodio-albumen process. It is true that portions of the picture are very good, but, taken as a whole, it is barely up to the standard of mediocrity. Mr. Hering sends nothing but copies of engravings, but they are exceedingly good copies, and to all appearance, quite equal to the originals.

Close to the ground, and where, but for their remarkable appearance, they would be passed by unobserved, are two instantaneous pictures of "Sea and Clouds," by Samuel Fry. The sombre, threatening appearance of the clouds seems to indicate an approaching tempest, and, so perfect is the representation, that it excites a momentary sensation of alarm for the safety of the vessels tossed about by the rough waves.

In the reproduction of architectural subjects, Messrs. Cundall and Downes occupy the first place in the Exhibition, and the number of subjects which they send is considerable. The best of them are two views taken at Osborne—one of "The House," the other of "The Terrace." The view of "The House" is by far the best representation of Her Majesty's marine residence we have seen. The details of the architecture are rendered with great clearness, and the whole picture has a bright, cheerful aspect, which is not always to be seen in photographs of such subjects. The view of "The Terrace" is worthy of equal commendation. A less imposing, but very nice print of a similar subject is forwarded by T. Greenish. This is a view of "St. David's Cathedral," the existence of which a great many of the visitors learn for the first time. Just at this part of the room the attention is powerfully arrested by a group of Bedford's prints. The first of these is a view of "The Eagle Tower, Carnarvon Castle," a good picture, both in respect to manipulation and subject. The tower is a fine object, and well rendered; the water is particularly good. "At Llanberis" is a beautiful photograph of a picturesque spot; the gradation of tone is very fine, the mountains appearing to melt away in the distance, while the water in the foreground is rendered with that effect which, we may venture to say, is peculiar to this artist. Frame 216 contains four prints, three of which are perfectly charming. The exception is the "View at Aber." There is too much glare in the foreground, and the scene is not so pleasing as the others. As regards the remaining three, the view in "Lledr Valley" is exceedingly good; the details are beautifully rendered; the water and foliage could not be surpassed, and the whole print has a wonderfully soft appearance. Quite as much may be said in favour of the picturesque view of "Pont Aberglaslyn"—a lovely spot, and one to which the photographer has done ample justice. The manner in which the water and the foliage, and the effects of light and shade, are reproduced, is worthy of the highest praise. The view on "The Lluywy" is also a beautiful print, but hardly equal to the preceding. It is a change in every way to turn from these representations of some of the most lovely scenes in Nature to views of streets in Chester. The view of "Bridge Street" is hardly worthy of Mr. Bedford's reputation. In his case it is not sufficient that he should produce a picture of which we can say that it is very good as a whole, but it should be perfect in all its parts, and this is not the case in the print under consideration. The upper part is all that could be desired, but the lower part has serious defects, which ought to have prevented him from sending it to the Exhibition. The view of "Eastgate Street Row" is much superior. The manner in which the quaint old architecture is represented is what it ought to be, and the print is a very interesting one. Hanging in the same frame with the view of "Bridge Street," and offering a striking contrast in every way, is one of the best of Mr. Bedford's prints. The scene is exceedingly picturesque, and selected with great judgment. The catalogue says it is "Pont-y-Pair" (we will not set our readers' teeth on edge by giving the remainder of the consonants which form a portion of the entry in the catalogue), and it is an infinitely more lovely spot than its name would seem to indicate. The print of "Conway Castle" is a very nice one; there is great clearness and definition combined with great softness. "A River Scene, Capel Curig," is not inferior to the preceding, but is excelled by that numbered 227, which is another view taken at Capel Curig. The perspective is excellent, the mountains gradually fade away in the distance, and the objects in the foreground are rendered with beautiful effect. The view of "Moel Siabod," is not equal to many other of Mr. Bedford's prints. There is a want of definition in many parts, and it is altogether inferior to its companion print, a "View of Trefriew Mill," in which the foliage is beautifully given, as well as the minor details of the picture. These do not include the whole of the prints exhibited by Mr. Bedford, but they are sufficient to show how much he contributes to uphold the character of the Exhibition.

A "View from the Cloister Window, Fountains Abbey," by J. Mudd, is a very good print as far as the foreground is concerned, but the remainder of the picture is not equal to it; it has a very picturesque appearance, notwithstanding. "Carew Castle," by T. Greenish, is a well-chosen subject, calculated to make a very effective picture, but it is hardly done justice to in the present instance; the picture is far from being a bad one, but it might have been better, considering the experience of the artist, so also might have been the view of "Guernsey," taken by Major Marsh. The moment chosen for taking it, was when it presented its most lively appearance; when two or three steamers were lying at the pier, and a good number of persons assembled to witness the debarkation, yet, in spite of this, the print is not one which we can regard with entire satisfaction, and we hope that at the next Exhibition the Major will exhibit a picture in which the manipulation will be equal to the choice of subject.

241, by H. Hering, is a remarkably fine copy of an engraving, the name of which is not mentioned, but we may presume it to be a representation of the Madonna, or one of the Catholic saints. The face of the woman is very beautiful, and the expression of gentleness, resignation, and faith, is wonderfully portrayed. M. Victor A. Prout has also devoted a good deal of time to copying paintings, and in this he has been far more successful than in taking photographs of the interior of Westminster Abbey. It would be difficult for a photographer to select an interior in which he would meet with greater obstacles to the practice of his art, than in that of Westminster Abbey. Those who like to worship in a "dim religious light," would be gratified by the appearance which the Abbey presents; but that which is conducive to the devotion of the worshipper is opposed to the successful operations of the photographer; and it is not surprising, therefore, that, with two or three exceptions, M. Prout's photographs, taken under these circumstances, are of very indifferent quality. At the same time, the beauty of the exceptions proves that the failure of the others is not owing to a want of skill on the part of Mr. Prout, but to the difficulty we have mentioned. 257, a view of "Pont Aberglaslyn," by J. Morgan, is a very nice print; the water is well rendered, and so is the foliage, but it is not equal in appearance to Mr. Bedford's view of the same spot, chiefly from its inferior dimensions, which exclude some of the beauties which we find in that artist's picture. 282 is a print by the late Dr. Holden, and, though toned to a peculiar colour, which gives it much the appearance of a carefully-finished pencil drawing, it is a nice, soft picture, and, apart from the subject and manipulation, it is regarded with a melancholy interest by those among us who remember the amiable man whose work it is. 284 is a view of "The

Terrace, Surbiton," by A. R. Hamilton, by the dry collodion process, and is a very good specimen of what it is capable of producing. Mr. J. H. Morgan has not been so successful in his picture of the "Mountain Stream" as he usually is. There is such a want of definition that it is actually difficult to distinguish the water from the rocks. If the success of the photographer in manipulating had been equal to the judgment he showed in selecting the subject, this would have been one of his most interesting pictures.

PROGRESS OF PHOTOGRAPHY IN AMERICA.

At a late meeting of the American Photographic Society, held at their rooms in the Cooper Institute, Mr. William Campbell exhibited a camera shield with a slide at the back, covering two holes. By this arrangement, one aperture could remain open, so as to admit of a photograph being taken; after which, new space could be brought to the focus for impression, and so on in a circle; then revolving backwards a second or inner circle of impressions could be made. The invention was deemed a clever completion of a hitherto-imperfect idea of improvement, for cheapness and rapidity.

Mr. S. D. Tillman read a short paper on photo-lithography, and presented twenty-five specimens of the art as recently improved in this city. Mr. Tillman said it was known and admitted in America that practical results had been obtained in the art of engraving by means of light. The advantages of this art were, first, permanency—the basis of its colour being carbon; second, fineness and facility of production. About 400 sheets can be readily obtained per day, and each might include from one to ten plates or designs. It was also cheap. The prominent objections to the ordinary photographic pictures were the want of uniformity in the tints, and their liability to fade. Various expedients had been proposed to remedy the first of these faults, but sufficient time had not elapsed to judge fully of the latest plans. Conditions of exposure might arise, to meet which the known remedies might fail; and therefore, the question of the unchangeability of the photographic pictures might, for some time, continue undetermined. The photo-lithographic pictures united the two essentials—exactness and permanency. No manipulation of art could equal or approximate the delicate shadings of the pencil. Whenever extreme minuteness of detail was required in permanent tints, preference should be given to the photo-lithotype. It would show microscopic specimens with great beauty and delicacy; and also surgical operations which could be stamped on the instant, in relief, superior to that which could be produced on photographic paper, because the negative being obtained from objects almost transparent, they could not be shown on such paper in tints of sufficiently strong contrast.

A letter was read from Mr. Joseph Dixon, of Jersey City, giving an account of a new method of counterfeiting, recently discovered. It seems that, a few years ago, he made some banks an offer to get up coloured bills that would be proof against imitation, but his offers met with only indifferent notice. He now puts a shot into their camp in return, by which their weakness is made somewhat apparent, if his process of counterfeiting was reliable. The secret, he said, lay in first obtaining the engraving freed from the colours, which was done by the use of either the megoscope or magic lantern, throwing a large image of the bill on a large screen of white paper. A tracing was then made of all the engraved parts of the picture, which, being on such an enlarged scale, could be drawn so perfect that the reduced picture would have precisely the same appearance as the original. A small negative could then be made, by which copies could be multiplied to any extent, and the protecting colours applied in the same manner as by the original engraver.

Mr. Thompson remarked that the Bank Note Company have an ink which gives impressions producing no photographic effect.

PHOTOGRAPHY AT THE UNITED STATES' PATENT OFFICE.

It appears that the Commissioner of Patents has made arrangements for the employment of the photographic process, as a means of producing the thousands of copies of drawings so constantly required to be executed at the Patent Office.

The inventive public, and all who have any interest or connection with matters relating to patents, will hail the introduction of this improvement with great pleasure. Its immediate tendency will be to cheapen the cost, and improve the character of the drawings, and greatly diminish the time required to obtain them. Two or three weeks are often required at present, before orders for copies can be filled; and the charge, as compared with what the same work can be had for outside the Patent Office, is exorbitant. For drawings which can be done elsewhere for a hundred dollars, a charge of *three hundred dollars* is made at the Patent Office. The introduction of the photographic process, if confided to the care of experienced and prompt artists, ought to enable the Commissioner to furnish copies of drawings, or views of models, almost on the same day that the order is given, and ought also to enable him to reduce the charges, as compared with the present rates, at least from fifty to seventy-five per cent.

Another benefit which will attend the employment of photography will be found in the improved character of the cuts which illustrate the annual reports of the Patent Office. We understand it is the Commissioners' intention to have the drawings for the reports photographed directly upon the blocks, ready for the engraver. This is a capital idea. The saving in time and expense is obvious, while the reports will be rendered much more valuable, because the engravings will be *fac-similes* of the originals, on a reduced scale; and, with care in the cutting, they will represent the invention much more clearly than heretofore. At present, the drawings are all reduced by hand; but the small space into which they must necessarily be compressed, renders clearness and exactitude, in many cases, impossible.

Commissioner Bishop also proposes, it is understood, to supply each of the examiners' rooms in the Patent Office with photographic copies of all the patent drawings that pertain to their respective classes. This will be a most admirable improvement. It is hardly to be believed that, at the present time, the whole business of the Patent Office is transacted upon a single set of drawings and records. Yet such is the fact, and the delay and inconvenience thereby occasioned have become a serious drawback to the efficiency of the department. The officials are compelled to pass away a large portion of their valuable time in running hither and thither among themselves, searching for drawings or records, or waiting for them while in use by others. It is believed that one-third the available time and business capacity of the Patent Office is at present wasted by this miserable "one-horse" system. Its removal, as proposed, would, not improbably, be equivalent to an increase of thirty-three per cent. in the working force of the department. It is strange that it has been allowed to continue so long; and we are not surprised that the officer alluded to, Mr. Commissioner Bishop, should have observed the defect, and sought the remedy so soon after his entrance upon his official duties. It is to be hoped he will make a thorough and a speedy reform in the matter.

Dictionary of Photography.

Ivory (Artificial).—Factitious or artificial ivory is employed as a recipient of positive photographic pictures, in lieu of glass or paper. It is a material that possesses all the good qualities of ivory, capable of receiving the same polish, and yielding pictures of remarkable delicacy and finish, with peculiar softness in the half-tones. Artificial

ivory, so called, is obtained by immersing sheets of pure gelatine in a solution of alum or of acetate of alumina. A complete combination appears to take place between the gelatine and the alumina: the gelatine is converted into a tough substance, which becomes hard and horny on drying. Slabs or tablets of this material of any required size may be prepared for the photographer's use, and polished by any of the usual well-known processes for polishing ivory.

A similar compound may be prepared by mixing the gelatine and solution of alumina together; but the process is tedious, difficult, and expensive.

Another kind of artificial ivory consists of equal portions of ivory or bone dust—used either separately or combined—and gelatine or albumen: the whole being worked into a paste, and afterwards rolled out into sheets, by suitable rolling or flattening mechanism. When hardened by exposure to the atmosphere, they may be cut to any required size.

Two parts of sulphate of baryta in fine powder, mixed with one part of albumen, well worked together, and rolled into slabs, forms a good artificial ivory. This compound may be spread upon paper, or thin cardboard, upon which proofs of great delicacy may be taken. The slabs are carefully scraped and polished, then washed with alcohol, to remove any accidental impurities. They are prepared in the usual manner for the reception of positives; when they are printed, the entire slab may be immersed for a few minutes in a weak mixture of nitric and sulphuric acids, or of nitric and hydrochloric acids, to render the picture clearer and more brilliant. The picture is fixed with hyposulphite of soda, and dried under pressure, to prevent warping. Photographs on artificial ivory were introduced by Mr. J. E. Mayall.

Lac.—A resin produced by the puncture made by an insect, the *coccus lacca*, on the branches of the *croton lacciferum*, *the ficus religiosa*, and other trees growing in the East. It appears in the market in various forms, as stick lac, seed lac, lump and button lac, and shell lac; the latter is the sort used in making sealing-wax, varnishes, lacquer, &c. It dissolves readily in alcohol, methylated spirits, and woodnaptha, forming varnishes; it also dissolves in an aqueous solution of borax. Lac, when bleached, is nearly colourless. It forms an excellent, clear, hard, transparent varnish for collodion negatives. Lac is also very useful as a cement.

Lens.—A transparent substance, one or both sides of which is curved, and which, according to this curvature, either scatters or collects the rays of light passing through it. Lenses for photographic purposes are made of glass, the different surfaces of which are plane, convex, or concave.

Lenses may be classed as of two kinds; those which have one or both sides convex, as the plano-convex and the double convex, and those which have one or both sides concave; the first cause the rays which pass through them to converge at a point called the focus; and the second cause the rays to diverge.

There are three kinds of concave lenses; 1st, the plano-concave; 2nd, the bi-concave; 3rd, the divergent meniscus. These three kinds of lenses possess similar properties. It is with convex lenses that the photographer has most to do.

As photography requires that the image produced by a lens be perfectly distinct over a given surface, it is necessary to make the lenses of a certain curvature. There are two defects to be got rid of—viz., chromatic and spherical aberrations: the first is avoided or corrected by constructing the lens of two pieces of glass of different refractive power (flint and crown); the second is removed or avoided by grinding the surfaces of the lenses of a given curvature.

For simple lenses, such as are employed for taking landscapes, we adopt the form of a convergent meniscus, of which the most convex surface is an ellipsoid, while the concave surface is a portion of a sphere, the centre of which is in the most distant focus of the ellipse.

Compound lenses are generally employed for taking portraits, on account of their large aperture, and, consequently, of the strong light they throw upon the proof, which permits of a picture being taken in as many seconds as a simple lens would require minutes.

A lens in which the chromatic aberration is corrected, is termed an achromatic lens, and the visual and chemical foci should coincide; that is, the chemical rays which act upon the sensitive surface, and the visual rays which depict the image on the screen, have their focus at the same point.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Glass Baths.—In speaking of glass baths, in our last, we described rather methods of forming glass linings to baths, than the building up of baths independent of any outer case. Where it is practicable, we recommend the adoption of a glass lining in preference to the use of a built-up glass bath, both as easier to make, and safer to use. Perhaps, one of the best methods of proceeding to form one of the latter, is that recommended by a correspondent a few months ago. The details given are to the following effect:—Procure two sheets of plate glass, a little larger than the inner dimensions of the bath required; also nine or twelve slips of stout plate glass from a quarter to half an inch wide; three or four of them as long as the width of the large sheets, to form the bottom of the bath, and the remainder, to form the sides, the same length as the large sheets, less the breadth of the bottom pieces. These strips should, if possible, be all cut from the same piece of glass, to insure uniformity of thickness. Three of the pieces, a bottom strip, and two for the sides, are to be coated with a thick solution of shellac, such as we described last week, and placed *upon the sides* of one of the glass plates, close to the edges, not on the edges, as is sometimes done in building glass baths. This process is to be repeated, laying one strip upon another, until a rim sufficiently deep is formed, and the other large plate is finally cemented on to the strips in the same manner. Care must be taken to adjust all the strips quite evenly, and see that they form a close, good joint at the corners. A weight is then to be placed upon the top piece, and the whole carefully put away into a warm place to get set. An oven is recommended by the writer suggesting the plan, and the heat a little short of that generally used for baking. The chief advantage of this method consists in the ease with which it may be effected; a firm joint being much more readily made on this plan than where the single strips of glass cemented at the edges are used for the sides and bottom pieces. On the other hand, it must be remembered that in thus multiplying the number of joints, the chances of leakage are multiplied in the same ratio. Another correspondent, who had successfully tried this plan, suggests one or two improvements. He says: —The end and side slips ought to overlap each other alternately at the bottom corners, and those composing one side might be bevelled at the top to form a spout; that the vessel may look and stand the better in an inclined position, the body should be formed a-twist. This may be easily done by allowing the slips to overhang each other at the top and bottom, forming steps. He adds, that a bath made on this principle, large enough to excite a whole plate, is filled with twelve ounces of solution.

Another plan of building a glass bath is as follows:—Take two stout pieces of plate glass of the required size, and with a little emery and water roughen the surface for about a quarter of an inch from the edge, at the bottom and sides, where the joints are to be formed. Take three strips of good stout plate glass, long enough for bottom and sides, and about three-quarters of an inch broad, more or less, according to the desired capacity of the bath. These must be ground perfectly true and square at the edges. To facilitate the manipulation, it is desirable to have a block of wood—or a book will answer the purpose—about the size, or a trifle less than the inside of the bath, in order to support the pieces in their respective positions during the process of manipulation. All the pieces of glass are to be made as hot as they can be conveniently handled, by placing in an oven for awhile. One of the large pieces is now to be laid flat, with the roughed surface uppermost to the book, or block of wood placed upon it. A piece of

marine glue is now melted in the flame of a spirit lamp, and run along one of the rough edges, as would be done in using sealing-wax, so as to give it a coating of cement. One of the side strips is now taken, and if not hot enough, its edge is heated by the spirit lamp, and then quickly brought into contact with the marine glue, whilst it is still melted; the strip should be rubbed backwards and forwards, once or twice, into its place, for the purpose of rubbing the cement well into the ground surface, and bringing them into intimate contact. The block of wood, or book, will support the piece in its position, whilst the cement is setting. The same process is then to be repeated with the other strips, the whole of which are fixed *within* the larger pieces. Two points are to be observed in using this cement: first, the glass, as well as the cement, must be thoroughly heated, to aid in effecting which, the spirit lamp will often be required; second, that care must be taken not to burn the cement. When the bath is thus far formed, a weight may be placed upon it, to keep the several pieces in their places. Three other strips are now to be cut sufficiently broad to cover each side and bottom. These are to be cemented on to the outside, entirely covering all the edges. This last process strengthens the bath considerably, and materially lessens the chance of leakage. The whole should now be carefully set aside until the cement is thoroughly hardened.

Some manipulators prefer yellow glass for baths; but if—as in all cases, whether the baths are of solid glass or built-up, we recommend it as a protection—the bath be incased in a wrapping of gutta percha, this is not necessary. A gutta percha wrapping is of especial importance for travelling baths, protecting them from injury in the first place, and saving the solution if by any chance the glass get fractured. It also affords facility for attaching supports to preserve the bath in its inclining position.

Most glass baths are made without any reference to the inclining position in which they stand when in use, and are square at the bottom, which, when the vessel is inclined, is therefore quite unsupported by any solid bearing. It is not an uncommon circumstance to hear complaints of the bottoms of glass baths being knocked out by the dippers. This want of a solid bearing or support for the bottom must materially facilitate these accidents. It may easily be remedied by bedding the bath with a support of the proper shape, made either of gutta percha or wood.

Although not an operation connected with glass working, it may be interesting here to suggest a simple mode of forming a cover to baths of any description. They may be made of gutta percha, as described in the chapters under that heading; but the plan we have always adopted is extremely simple and efficient. Take a strip of brown paper three or four inches wide, and sufficiently long to go round the top of the bath, overlapping an inch or two at the ends. Glue the part that overlaps, allowing the paper to fit sufficiently loose to slip easily on and off. Enough should be left projecting above the bath to double over, when properly cut, and form a top to the cover. The form of the piece of paper is shown below:—

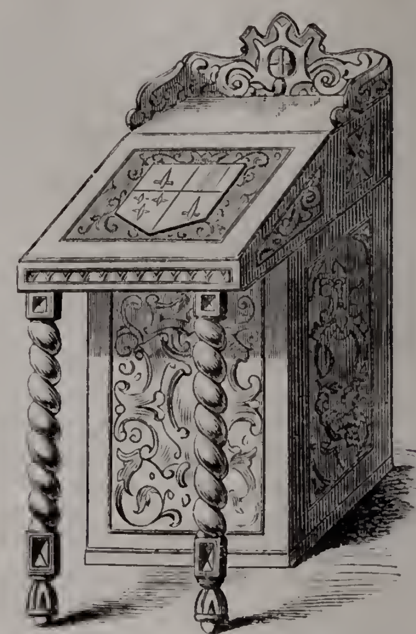
The dotted lines show where the paper is to be folded, the part projecting above the bath being clipped at the corners with a pair of scissors, so as to fold down and form the top. When each part is glued down, and fitted into its place, another long strip of brown paper is to be glued all over and wrapped round and round, just in the same manner, cutting the corners at each complete turn, and folding down the projecting parts on to the top. About half a dozen folds will make, when the glue is set, a stout card-board cover. It may be neatly finished, if the manipulator have taste, by covering with coloured paper, bookbinders' cloth, or leather. It will be found more convenient in use, if the first fold round the bath, forming the lining to the top, be of stout glazed calico, or even of the patent glazed japanned cloth used for table covers, as it will not then become rough and difficult to put on and off.

(*To be continued.*)

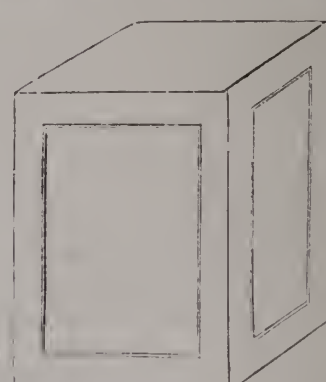
BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

FURNITURE, &c.

A very useful and convenient article for the studio is a deal skeleton case, or a close deal box, about three feet high



by two feet ends and sides (*fig.* 1). This will answer the purpose of a table, with a cloth thrown over, or as a pedestal



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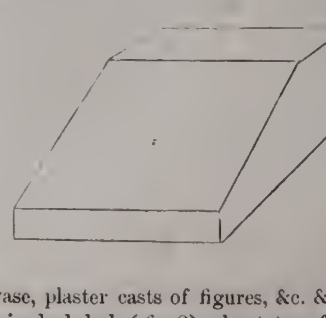

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for a vase, plaster casts of figures, &c. &c. Another article is a plain deal desk (*fig.* 2), about two feet each way; two

pieces of deal, three feet by two inches broad, half inch thick (*fig.* 3); and one piece of millboard (*fig.* 4); and two pieces (*fig.* 5). Now paint the box (*fig.* 1) in oil or dis-

4

5

temper, and ornament the front and ends in scroll work, or carry up mouldings, to give the appearance of panels; do the same with the desk, and cut out the pieces of millboard (*figs.* 4 and 5), and glue the same on the top of desk; then fix the half-inch pieces (*fig.* 3) in front, painting or cutting them out as the twisted scroll. When the whole is put together, it will form the ornamented piece of furniture seen in our illustration, which may be used in various ways to give effect to standing or sitting figures. On the slope of the desk crests or coats of arms could be placed, sketched in bold outline.

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 11th February, 1860.

NINETY-EIGHT per cent. of the nitrate of silver employed by the most experienced photographer to sensitise their plates or their paper, is carried away into the fixing and washing baths; in other terms, on a sum of one hundred shillings expended, or converted into nitrate, about five shillings only are utilised in the production of the photographic image. These figures give us an idea of the immense loss any photographer must sustain if the contents of the fixing and washing baths are not turned to account in one way or another. Then comes the question, which is the most economical and effective manner of extracting from these baths the silver they contain? I do not know how you operate this in England, but in France the liquid residues are carefully collected in appropriate glass jars, and the silver they contain precipitated, without any previous operation, by sulphide of potassium. The precipitate, which is principally formed of sulphide of silver, contains, also, sulphur organic matter, &c.; it is collected either upon a filter, or by decantation, and then dried. It is afterwards calcined in a crucible with nitrate of potash. The result of this calcination is a melted lump of pure silver. It is curious enough that in this case a *reduction* takes place by means of a powerful oxidising agent. The nitrate of potash employed, however, plays here, as everywhere, the part of a powerful oxidiser; its oxygen is given to the sulphur of the sulphide of silver precipitated, to produce sulphuric acid; this unites with the potash of the saltpetre, forming sulphate of potash, whilst pure silver is put in liberty by the decomposition of the sulphide; at the same time, gases (oxides of azote) are evolved from the decomposition of the saltpetre. Waste photographic paper, impregnated with salts of silver, may be carefully burnt in wide, open crucibles, and their ashes collected. To these ashes must be added their own weight of a mixture of nitrate of potash and carbonate of soda, both dry; and this mixture may then be added to the sulphide of silver to be reduced, or heated separately.

The *Cosmos* of this week describes the processes recently discovered by M. Poitevin and the Count Schouwaloff, to obtain, at will, either negatives or positives, on the same plate. As I have already referred to these experiments some weeks ago, I shall not return to them again here. The same journal informs us that "during the first days of January last, his Holiness Pope Pius IX. deigned to sit before the objective of one of the most experienced photographers of the eternal city;" the portrait was obtained successfully, and sent off to MM. Bisson, *frères*, of Paris, who have taken copies of it in every shape and size, and exposed them for sale.

A new kind of reflector is described in some of the Paris papers. It resembles the well-known silvered mirrors, but differs from them in an important point! The silvered reflectors, when exposed to the atmosphere, are, sooner or later, acted upon and corroded by several gases, such as sulphuretted hydrogen, chlorine, &c. It appears that at sea, or in lighthouses, it is impossible to maintain their proper degree of polish. The inventor of the new kind of mirrors, in connection with the president of the *Société de la Presse Scientifique*, has substituted platinum for silver in the construction of these reflectors; platinum not being affected by the above-named gases. The metallic platinum is, to this effect, precipitated from its chloride by means of essence of lavender, and fixed by a varnish consisting of a dissolution of borax. It appears that these reflectors can be offered for sale at the same rate as the silver ones. The inventor does not say whether they are as brilliant as the latter.

M. Fremy has lately presented to the Academy of Sciences of Paris a most important paper upon the "Chemical Composition and the Production of Gums." A few days ago, if any chemist had been asked—what is gum? or—taking the purest variety known—what is gum arabic? he would probably have answered, that it is a peculiar, immediate principle of the vegetable kingdom, soluble in water, containing no azote, and belonging, seemingly, to the group of ternary substances, which comprises sugar, starch, cellulose, &c. M. Fremy's researches have, however, thrown a very novel light upon the subject. Gum arabic is not a neutral, immediate principle, like starch or sugar, but a salt, composed of a base (*lime*), united with a very weak acid, which the author calls *gummic acid*. Gum arabic is, then, properly speaking, gummate of lime. By the influence of heat, or by that of certain concentrated acids—such as sulphuric acid—this gummic acid is transformed into a new *insoluble* substance, which is also an acid, and which, having the same chemical composition as the former, constitutes an isomeric variety of it; to this new substance the name of *metagummic acid* has been given. Gummic acid, and its insoluble isomeric variety—metagummic acid—contain about 41 per cent. of carbon, 6 per cent. of hydrogen, and 53 per cent. of oxygen.

These interesting results will have, doubtless, also their useful applications, sooner or later; for when it is known with what ease gum and its derivatives can be transformed into isomeric substances which are insoluble, it is probable that it will one day be discovered how to employ gum like albumine, in dyeing and calico printing, for fixing insoluble colours.

MM. Guillemin and Burnouf have been making numerous experiments on the transmission of electricity by telegraphic wires, with a view of discovering some law which governs this transmission. They conclude from their researches that the electric fluid is not propagated like the waves or undulations of light, and that it has not a constant and uniform velocity. They find it necessary to fall back upon the idea of Ohm, expressed in 1827, that electricity is propagated through wires, in virtue of the same kind of laws which govern the propagation of heat in a metallic bar. To determine experimentally which of these two opinions ought to prevail—that is, whether electricity is propagated with a constant and uniform velocity, or whether it is transmitted like heat—the authors disposed an apparatus, showing the intensity of the electric current in a certain point of a conducting wire, at different instants of its propagation. The first or the second opinion would then be justified, according as the current acquired suddenly in this point its definite intensity, or arrived at this intensity gradually. The authors found that the current at the point in question

began with a very feeble intensity (the galvanometer marking 0° 50′), which augmented gradually, and soon attained a maximum which it did not surpass, however long the contact of the pile with the conducting wire was continued. This maximum or permanent state was obtained in 0·024 of a second of time (the galvanometer then marking 19° 50′) in 4 lines of different lengths. The experiments were made during very fine weather, from 10 to 12 o'clock at night, from the 4th to the 6th of October, on a telegraphic circuit of 104 leagues in length, passing from Nancy to Strasbourg, Mulhouse, and Vesoul, back to Nancy.

Many scientific men assert that croup is caused by the invasion of the windpipe by a parasitic fungus; others pretend that it is an anormal membranaceous production, and not a fungus, that invades the respiratory canal. Many means have been tried to destroy this false membrane, or to kill and expulse this parasitic fungus. For some time past, nitrate of silver and hydrochloric acid have been used to this effect. More recently, Dr. Ozanam, of Paris, has employed bromine, seemingly with great success. A few days ago, M. Jodin proposed to the Academy of Sciences at Paris the use of perchloride of iron, applied with a camel's-hair brush. He says this method succeeds well, if the whole of the fungus can be touched with the iron solution, and a slight pressure be employed in applying the latter. If any points of the morbid membranaceous matter be left untouched by the perchloride of iron, from these points the disease will spread again.

THROUGH JAPAN WITH A CAMERA.*

(From our own Correspondent.)

As there was nothing to be gained by keeping in motion, we turned our attention, while waiting for the return of the ducks, to searching for nests. We found several, but we only took about thirty eggs, out of consideration for our raftsman, who suggested that this wholesale way of destroying ducks would ruin them if carried too far, of which, it seemed to me, there was little danger; for when I, the same evening, had converted the greater portion of them into an omelette, nobody beside Dsetjuma, who himself did not seem to care much about it, would touch it, always excepting myself, who made a better dinner than I had made for some time previously. To return to the ducks. It was not long before we saw a party of them flying towards us. As it is considered a proof of great skill to hit a duck while flying, Dsetjuma determined to try his fortune. He stood up, fitted an arrow with great care, and let it fly at an angle of about forty-five degrees. The arrow flew through the air with such velocity as to prove that it might be a deadly weapon in skilful hands if used against a man, and though the bird penetrated by the arrow seemed to dart a little on one side, as if with the view of avoiding it, it was too late: it came headlong to the water, the arrow still sticking in it, and quite dead. Dsetjuma was very proud of this feat, which was greatly applauded by our raftsman, and I was not surprised at it, for, though not a bad shot myself, I question whether I should have been able to have done as much with a gun, in the case of birds flying at such a height and with such velocity.

When we had had sufficient duck-shooting for a time, our raftsman proposed to take us across the lake, and so give us an opportunity of satisfying ourselves as to its immense depth. I must confess I did not at all like the idea of navigating deep water in such a craft at first, but a little reflection showed that there would be no real danger, or he would not have proposed it; moreover, if I happened to tumble in there would be little difficulty in swimming ashore, so I made no objection. As for Dsetjuma, he has such a thorough conviction that no man would dare to run him into danger, that he accepts any proposition that may be made without the slightest thought as to possible consequences. Our assent having been given, the raftsman laid aside his bamboo pole, and substituted for it another having at the end a fan-shaped paddle made of bamboos about a foot long, which had been split down the centre, and bound together side by side, a convex side alternating with a concave one; a very capital idea it seemed from the rate at which he was enabled to send the raft along with it.

The rapidity with which our man could urge the raft along, by means of the paddle I have described, was surprising, as well as the facility with which he could direct its course; we were not long, therefore, in reaching the centre of the lake, where we remained stationary for the purpose of ascertaining its depth. A reel was produced, round which was wound a quantity of twine, to the end of which the raftsman attached a lump of iron ore, by a hole bored through it for the purpose, and then dropped it into the water. At first, the descent was rapid; but as the increased length of string increased the amount of friction to be overcome, it grew slower and slower, until it stopped altogether, but I question whether the weight rested on the bottom of the lake even then. As I generally find that uncommon heights and depths are very much exaggerated by the inhabitants of the districts in which they are situated, I did not trust the assertion of the raftsman on the subject, but drew up the line with my own hands, measuring it, as I did so, in the usual way in which you estimate a yard, and I found that the length of string immersed in the water was one hundred and eight yards. The water, which was beautifully clear, appeared in this part of the lake of a dense black, no doubt owing to its great depth. It had no peculiarity of taste, either at the surface or at a great depth, though there was a decided increase of temperature in that taken from the lower stratum. The manner in which we got water from the bottom of the lake was by means of a cone-shaped earthenware vessel, having no opening except a small hole at the apex, and another very small hole in the broad part, which was stopped by a gum of some kind, soluble in water. This vessel was attached to the weight I have already mentioned, with the apex downwards, and then placed in the water and allowed to descend. As a proof that the bottom of the lake was not reached on the first occasion, I may observe, that I remarked that a greater length of string was immersed on the second descent, but I did not remark it until it was too late to estimate it without measuring the string again, and I did not feel disposed to take that trouble. To return to the vessel in question. It was allowed to remain at the bottom about a quarter of an hour, by which time, the man told us, the gum, which stopped the little hole at the base, would be dissolved, and the air, which filled the vessel, be forced out through it by the upward pressure of the water, which entered the vessel through the larger hole below. When this was supposed to be accomplished, it was drawn up, and a tiny wooden peg thrust into the hole in the bottom of the vessel, and we had then a perfect bottle. As I said just now, the temperature of this water was considerably higher than that taken from the surface, though we had no better method of ascertaining the difference than pouring some of each alternately on the back of either hand.

The method of getting water from great depths, adopted by the Japanese, may be a rough one, but it appeared to me to be a tolerably good one; whether it resembles that adopted by Europeans I cannot say, as I never either saw the apparatus, or read a line respecting that used by them for a similar purpose.

By this time we began to feel tired of our cramped position on the raft, and decided on going ashore, where we were glad to find a woman busy in the preparation of dinner, to which our contribution was a welcome addition.

[We suppress that portion of our correspondent's journal which refers to events which happened during the remainder of his stay at this place, as being without any particular interest.]

When the day came for our departure, we found that the guide who was to conduct us to the ruins had not presented

* Continued from vol. iii. p. 275.

himself; and, after waiting several hours, we had just made up our minds to go without him, when he came up with a pitiful tale about his lord having forbidden him to go, which Dsetjuma cut short by telling him that he lied, and that he had been making himself drunk with sacchi—a charge which was not without foundation, if I may draw a conclusion from his appearance, and it is a kind of distraction, too, which is more common in the provinces through which I passed than in the city of Nangasaki itself.

The necessity for a guide arose from the situation of the ruins, which, as I have already mentioned, we had turned aside from our road to visit. The paths by which we travelled were very difficult for horses, and, in some places, even dangerous. Our way lying among the mountains, it was frequently so steep that Dsetjuma dismounted, and preferred to be dragged up, by hanging on to his horse's tail, rather than risk tumbling off backwards by remaining in the saddle. The progress we made was very slow; and it soon became evident that, owing to the lateness of the hour when we started, we should be unable to reach the little village in the mountains that night. It was therefore determined to halt, before it got too dark, to collect wood, and make arrangements for passing the night as comfortably as possible. A good fire was made, and our tent erected on the side from which a slight breeze was blowing; and, with tea, pancakes, and some cold roast duck, we made a very satisfactory meal; after which, I filled my meerschaum, which I had brought with me from Holland, and which was a wonder in the matter of colour and workmanship, and Dsetjuma rolled up some tobacco in a bit of thin paper, and we began talking over the events of the day, until we felt disposed to sleep. We were roused early in the morning by the screaming and shouting of the servants, one of whom, it appeared, had been woke by a wild-cat biting his leg. These animals are large and very savage, but we never met with them except in these mountains, so that they do not trouble the people much. Once awake, we did not think it worth while going to sleep again; so we began to make preparations to start, in the hope that, by pushing on rapidly, we might reach the ruins in time to get some pictures of them. The paths became worse and worse as we proceeded, and made travelling so difficult, that I was unable to thoroughly appreciate the savage beauty of the scenery through which we passed, which was far more attractive than that met with among the Alps; for though there were huge masses of rock, the rugged sides of which were bare, there was a vast number of trees growing in every valley among the mountains, as well as abundance of lichens and coarse grass.

Notwithstanding the altitude we had reached, it became intensely hot as the sun ascended, and we were exceedingly rejoiced when, through a cluster of trees, we caught sight of what seemed a huge tower, and which, our guide told us, was a part of the ruins we had come to visit.

We found ourselves on a rather broad plateau, about a quarter of an English mile in length, shut in by mountains on either side, and the ruins of the principal building covering quite two acres of ground near the centre. The only portion of them which remained in such a condition as to enable us to form an idea of its style of architecture, was that we have mentioned as having the semblance of a tower. It was built of large blocks of roughly-hewn stone; and though much of it had crumbled away under the influence of the weather, it was still quite twenty feet high. The interior was filled with fragments of stone and dust to a depth of several feet, and we had a good deal of difficulty in climbing up to the top of the rubbish. The walls inside had evidently been covered with plaster, for here and there I found bits still adherent to the walls, and I am inclined to think they had once been painted or coloured in some way. This tower seemed to have been built separate from the rest of the edifice; and its external aspect showed that, though the foundation had been square, the diameter was gradually diminished as the builder progressed in his work; and this was so obvious that, taking into consideration the quantity of rubbish inside, I am disposed to think it was ultimately brought to a point, and, if so, the altitude must have been considerable. In the print, the inward inclination of the walls is very perceptible, and it is the only one which gives any idea of the shape of the edifice which formerly stood on this spot; the remainder are only representations of immense heaps of decaying stone, which merely serve to prove the immense dimensions and solidity of the edifice, and that there was a time when there were architects among the Japanese who possessed infinitely more genius than those which exist at present. In justice to the latter, however, I must say, that to raise such a building as this I have been speaking of in any other situation than among the loftiest range of mountains, would be an act of folly, as the frequent earthquakes would soon shake it down if it were built on the low land.

Not the slightest information could be obtained from our guide as to the rise and origin of the building which formerly stood here. There was no legend or tradition respecting it; the suggestion, that it was the residence of the gods before they created man, I am disposed to think originated in the brain of our guide.

(*To be continued.*)

New Photographic Apparatus.

MELHUISH'S METAL CAMERA.

It is a characteristic of most useful inventions, that when they are produced, we marvel that they were not thought of before. For upwards of twenty years we have been using cameras of various kinds of wood, which, although very elegant as specimens of cabinet work, have possessed the undesirable qualities of great weight, liability to warping and breaking, and to distortion. These objections are felt in their full force, especially in travelling, and in hot climates; to meet which objections the metal camera especially recommends itself. In a comparison between the cameras now in use and the metal camera, we find that when the two kinds are made of equal strength, the metal one, if of brass, is one-third lighter in weight; while, if made of aluminium, it will weigh one-sixth of the weight of a wooden camera. Thus, a camera, &c., weighing eighteen pounds, when made of Spanish mahogany, will weigh twelve pounds if made of brass, and three pounds if of aluminium.

With a photographic camera constructed of aluminium, the problem so frequently proposed—the lightest possible weight of the travelling artist's baggage—will be solved; while it is evident, that changes of climate, heat, or moisture, which, sooner or later, materially damage a wooden camera, can have no effect upon a metal one. Aluminium is a metal that resists oxidation, and is not acted upon by vegetable and mineral acids, with the exception of hydrochloric acid. Besides, it is as hard, ductile, and malleable as iron—qualities that especially recommend it for the purpose to which it is now applied—the construction of a light, portable camera.

In manipulation, metal presents many important advantages over wood; the latter material absorbs heat from the sun, and moisture from the wet plates, while metal reflects the sun's heat, and really prevents evaporation. A wet plate will keep as well five or ten minutes in a metal slide, as one minute in a wooden one—a great advantage in a hot climate.

The wet collodion slide, hitherto in use, generally stains the plate more or less, and the bath solution that drains from the plate gradually rots the slide. Just the opposite result takes place in the metal slide, which, being electroplated with silver, neither affects nor is affected by the nitrate solution of the sensitised plate, but exhibits the rare phenomenon of a negative clean to the edges.

The metal *dry* plate slide does not affect the sensitive plate,

but rather preserves it, the fittings being nearly air-tight. In wooden slides the plate is soon injured by the development of spots, doubtless nuclei of decomposition arising from emanations from the wood. Dr. Norris found that when his dry plates were sent out packed in wooden grooves, they were generally spoiled before reaching the customer.

There is a mechanical feature in Melhuish's metal camera which possesses strong claims upon our admiration: it is, that the metal shutter of the dark slide draws *downwards* instead of upwards, thereby preventing the possibility of light reaching the sensitive plate. Under the usual arrangement, the shutter of the dark slide draws upwards, requiring no little care and dexterity, even when covered with a cloth, to prevent the light penetrating and fogging the plate.

The great economy of space presented by the metal camera is not the least of its recommendations. For instance, a stereoscopic camera, for plates $6\frac{1}{2} \times 3\frac{1}{8}$, with sliding front, six double dry plate slides, one wet collodion slide, and focusing frame, together with a pair of quarter-plate double combination lenses, adapted for taking portraits and views, packs, without taking to pieces, in a leather case, 7 inches long, $3\frac{7}{8}$ wide, and 8 inches deep, and weighs about six pounds: if constructed of aluminium, it would weigh about two pounds. The average thickness of the dark slides, double or single, is only three-eighths of an inch.

By constructing the framework of the metal camera of suitable strength, to insure rigidity and firmness, the filling up may be of metal of any degree of thinness, since the purpose it serves is only to exclude the light: in large cameras this filling up might be of any light material, such as *papier maché*.

In taking stereoscopic views, a metal sliding bar, upon which the camera works, enables the operator to command an angle of 200 degrees.

We consider, therefore, that, for certain purposes, the metal possesses advantages over wood. It is probable, however, that for home operations, in the operating room, the wooden camera will continue to obtain the preference, on account of its more showy appearance; even in that case, it would be an advantage to have it furnished with metal slides. For out-of-door operations, and for hot climates, there can be little doubt that the metal camera will obtain the preference.

Proceedings of Societies.

South London Photographic Society.

The ordinary meeting of this Society took place last evening, at the Lecture Hall, Walworth; the Rev. F. F. Statham, B.A., F.G.S., President of the Society, in the chair.

The minutes of the last meeting having been read and confirmed, an animated discussion took place on a paper previously read by Mr. Leake, after which,

Mr. W. Clarke read a very interesting paper on the improvements that had been made in the apparatus used in photography. Cameras, he observed, were manufactured of various kinds of wood; but one had lately been patented, and introduced to the photographic world, made of metal. Some time ago, too, dark slides made of papier maché had also been invented, and had the reputation of being most perfect. Among other qualities, they were not to break if accidentally let fall, a most fortunate circumstance for a photographer if a long distance from home, and they were extremely light; but, as was generally the case with such wonders, they soon disappeared. Photographers were continually being startled by some new discovery or other. The patent metal camera, according to what had been put forward, promised to take the lead, and mahogany cameras were to be at a discount; but when their real advantages were carefully examined into, these new inventions were often found to disappoint the purchaser. Their novelty, however, made them more profitable to the manufacturer. A great disadvantage of dark slides was, their remarkable thinness; for by pinching them, you must press against the prepared plate, and consequently spoil it. At the same time, it would be most unpleasant if every time the camera was to be used, the backs were to be taken out, for there was a danger that in doing so, the slide might be imperceptibly opened, and the prepared plate rendered useless. He thought it would be found too expensive for general purposes, and would not answer for general cameras. What really was required, was something cheaper, and more simple. Messrs. Bland and Co. had brought out a binocular camera, for views and portraits; but it had the same fault as the one already referred to—the back had to be taken out before a focus could be obtained. The Messrs. Squire had also a very ingeniously constructed camera, for views and portraits. The lenses are fixtures to the inside front; the focus is adjusted with the greatest accuracy by means of a long screw that passes through the bottom of the board, and inside the body; and, instead of drawing out at the back like an ordinary camera, it draws out in front. It has two discs in the front lenses, with four different-sized apertures in each, similar to those under the stage of a microscope, and by means of a metal shutter two lenses can be opened and closed simultaneously; but unfortunately the backs are packed inside. Personally, he did not like binocular cameras, for he did not think so beautiful stereoscopic effects could be obtained from them as from the sliding cameras. For portraits and groups, however, the binocular was certainly the best; but for views, where there was distance, the pictures were required to be taken at greater angles. Messrs. Burfield and Rouch had adapted the falling camera for their stereoscope, but it did not offer any special advantages over some of those already referred to. Messrs. Horne and Thornethwaite had a very compact camera for stereoscopic purposes; in fact, to his taste, it was the most perfect of any that he had yet mentioned. The double backs, of which there are four, pack into the box lid, which, when open, forms a part of the table for the camera to slide upon; by which means the camera can have about 14 inches movement. The camera is a folding one, and is a fixture to the sliding piece in the back. All that has to be done is to turn the camera round, and press out the front, which allows the body to fold up, and the top of the box incloses the camera. No person would have any idea that it was a camera by its appearance, when the whole is shut up. Mr. Clarke exhibited a pocket stereoscopic camera, "the Tourist," which he was the first to bring out, and from which, he believed, several tracings had been taken and improvements made by other manufacturers. There were several kinds of large cameras for views and portraits, intended to be used both in the wet and dry process. There was the ordinary double-bodied camera, the folding camera, the double-bodied folding camera, and the India-rubber and bellows-bodied camera, each of which had its admirers. Unfortunately, their weight and size, for very large views, rendered them anything but portable, although made of the lightest materials. The most convenient camera for his purposes was the double-bodied camera, which was the one almost universally used. It was the best when weight was not brought into consideration, for folding or for the operating-room. It was the most rigid and easiest adjusted of any camera in use, and it possessed another advantage—the chemicals could be packed inside. After describing the advantages offered by the other cameras to which he had referred, he said he had often been asked which was the best wood to make cameras of. If for India, he would say teak, or good Honduras mahogany, well screwed, brass bound, well polished, and the inside varnished with a dull black, for the spirits would fill up the grain as the polish did the outside. This was much better than lamp-black mixed with water, which was generally used. Cameras that were intended for indoors could be made of deal, and they would stand exceedingly well if properly put together, and would be much cheaper, both in material and in the time of making.

Mr. Martin then exhibited a camera on a new principle, and read a paper descriptive of its advantages.

A panoramic camera, containing a very fine negative, was exhibited by Mr. Sutton.

The question arose whether positives could be printed from the negative; it was answered in the affirmative, by having a block of similar curvature to the negative, by which the positive paper can be kept in close contact.

Votes of thanks were unanimously accorded to Mr. Clarke and Mr. Martin for their interesting papers, and the proceedings terminated.

French Photographic Society.

At the sitting of December 16, 1859, M. Regnault, of the Institute, President of the Society, occupied the chair.

After the election of several new members, MM. Davanne and Girard presented the following observations on the alteration of positives, in connection with the communication made at the last sitting by Dr. Voltier.

Dr. Voltier, at the last sitting, communicated to the Society an interesting fact. He had exhibited two paper positives; one sent to him from Shanghai, being tolerably old, had become entirely changed, that is to say, had assumed the yellow tints so objectionable to photographers; the other was made from a strike recently obtained by placing before the dark chamber the first-mentioned changed proof. Between the two a great difference was to be found. In the second, numerous details were, in fact, very evident, and perfectly developed, which, according to Dr. Voltier's own words, were as though certain portions, although invisible to the naked eye, still continued perceptible by means of the object glass. This observation comes too much to the support of the theory we have advanced, as regards the change in positives, to be passed over by us without remark. We have stated, in effect, that the alteration in photographic proofs was due to the more or less rapid formation of yellow sulphate of silver, but should not be attributed to a disappearance, otherwise inexplicable, of the silver coating the proof. But if we study the fact communicated by Dr. Voltier, we shall then find a perfect demonstration of this theory. In the deeper shadows, indeed, on which the layer of yellow sulphate of silver is thick, the impression retains a decided colouring, but in the half tints in which the colouring matter of the impression is less abundant, it may be remarked, in consequence of the alteration, that it is replaced by a layer of sulphate of silver, so little coloured as to be scarcely perceptible to the naked eye. But if this changed sheet be placed before the object glass, and if it is attempted to reproduce it on a layer of sensitive collodion, the yellow portions, imperceptible to the naked eye, act by means of the negative photogenic properties, which, as is well known, are peculiar to yellow substances, and act in the same manner as black substances. Leave without printing the corresponding portions of the strike, and then reproduce the images hitherto invisible to the eye, whose substance has not disappeared, but has been simply modified by the colouring.

MM. Davanne and Girard communicated to the Society the result of their general study on positive photographic proofs. See pp. 219 *et seq*.

The thanks of the Society were voted to MM. Davanne and Girard, and were ordered to be inserted in the Bulletin.

After the communication made by Mr. Thomson in Mr. Woodward's name, in the former sitting, several photographers endeavoured to ascertain if it were possible to adopt his system of enlarging impressions to the ordinary dark chambers. On this subject Mr. Thomson writes, that the Woodward apparatus is formed of a dark room, similar to that in ordinary use in America. In this, however, it is not in the hinder extremity that the ground glass and the sensitised plate are placed, but the groove intended to hold them is placed at about two-thirds in the chamber distant from the object glass. The hinder third serves to maintain a certain shadow in the neighbourhood of the ground glass. To convert this chamber into a Woodward apparatus, it is sufficient to maintain the impression in its place, and to insert at the extremity the large lens, but a little further off from the mirror, which is destined to receive the light. Mr. Thomson also thinks that it will be easy thus to transform all the ordinary dark rooms at present used in France.

M. de la Blanchere made the following observations, with regard to the communication made by Count Schouwaloff, on obtaining direct positives in the dark room:—

On the 3rd of September, 1856, I published, in the journal *La Lumière*, my first observations upon impressions, which I at first called amphitypes, and rather later (in my publications of 1857) more properly *amphipositives*. At this time I directed the attention of photographers to the various phenomena of the grouping of portraits, and one of them (M. Forbin) replied, "The English continued my studies last year, and I see, with great pleasure, that M. de Schouwaloff is now doing the same thing." I thought at first, as he did, that this process might be the object of a tolerably certain method of thus obtaining direct positives in the dark room, and might, consequently, be applied to stereoscopic views and transparent portraits. More fortunate than myself, the new inquirer announces his discovery of this method, but I have not yet been able to obtain by it a constant and reliable result. The tone of the impressions obtained by me always appeared to be somehow wanting in vigour, whilst the collodion layer appeared always covered with a grey or silvered tint, in spite of all my efforts and using all the agents I was acquainted with to remove it. However this may be, the fact itself remains one of the most curious, and I find, in the circumstances described by M. de Schouwaloff, the exact counterpart of the facts observed by me. (See the *Art du Photographe*, page 125, and after.) It is, I say, extremely curious to behold suddenly without the intervention of light, but by means of a mixture of argentiferous solution with pyrogallic liquid, a feeble negative image instantly change to positive, by means of transparency and reflection, and then become normally developed in this state. We quite agree with the observation of the fact, that between the positive and negative portions of the image a white halo is observed, more defined than in either of them. This little circle, as it is called by M. de Schouwaloff, sometimes appears upon an entirely negative proof; this is the first degree of amphipositive change on the transmission of light. It shows a black halo upon paper, being itself more translucent than the adjoining parts. We also partake his opinion with regard to the use of an old bath of slightly iodised collodion, but which we have long attributed to the quality of light. In effect, I was never able easily to reproduce it until towards the close of day. But a further series of experiments has destroyed this hypothesis. We imagined that this particular discovery was due to the action of pyrogallic acid; a new fact, curious in several points of view, was the result of the development of proto-sulphate of iron. (See *L'Art du Photographe*, § 37.) The following is the experiment:—A layer of our sensitised dry collodion was printed during the day, by means of twenty other stereoscopic glasses, then a silver bath, which had not been sufficiently dried for the application of proto-sulphate, produced an intense reaction. The result of this was the precipitation of dark metallic silver cloudings upon the collodion layer, every portion of the image submitted to the reduction became immediately amphipositive, whilst the remainder retained the negative image. The other glasses, properly dried, were all negatives. This fact would tend to show that the phenomenon of amphipositivism depends on the proportion of nitrate of silver used on the developed surface. I will close this note by mentioning an analogous fact, which has escaped the observation of M. de Schouwaloff. I happened, whilst developing a negative proof, to observe the time of stopping which precedes the change to the positive, if a small portion of nitrate be added to the development. If I desire to avoid the change to a positive, I immediately wash in a large quantity of water, and transpose the two agents. In the first development the pyrogallic acid rises to the surface as a layer of azotate of silver. After washing, I first deposit the pyrogallic acid, with which I take care to moisten the layer, and then add to the development the necessary quantity of solution of silver. In this manner, the amphipositive tendency becomes striped, and the proof is developed negatively. I have also remarked a rather curious case of amphipositivism, which I have described in my work. It is that in which a negative transparent proof, exhibiting the transparent portions, as the hair, the hollows of the eyes, the pupils of the eye, the under portions of the chin, &c., are silvered, that is, covered with a brilliant white metallic deposit, as though it had been deposited on a polished surface, by means of galvanism. Sometimes the deposits assume a mere grey colour. With regard to the red transparent portions observed, partially amphipositive upon negatives, they must, I imagine, be the result of inequality of fixing. They may be easily produced, if a solution of pyrogallic acid be poured over a negative fixed with cyanide of potassium. Finally, we are happy to observe the continuation of studies so curious to those first undertaken by us, and shall not fail to make known to the Society any new facts which may be not less curious than the phenomena of amphipositive proofs.

The thanks of the Society having been voted to M. Blanchère for his communication, and the order of the day being exhausted, the sitting was adjourned.

Photographic Notes and Queries.

METAGELATINE PROCESS.

Sir,—A recent number contained a few valuable hints from Mr. Maxwell Lyte—hints of more importance to the photographer than whole pages of theoretical science, or the wearisome lucubrations of facetious and constant correspondents.

I will only trespass on your valuable space to say that I believe a communication from that gentleman on the "*Metagelatinary*" process (of which he speaks so highly), would be a great boon to many who are sorely puzzled by this vexed question, which promises to become confusion worse confounded.

Will you kindly support my request to Mr. Lyte, and beg him to come to the rescue? W.

CLEANING GLASSES.

Sir,—For the last three or four years we have been in the constant habit of cleaning our glasses in the following manner:—We place them in a pan of water, with a handful of common soda, and leave them till required, when we rinse them well in clean water, and dry them in the usual manner. If they have been varnished, they are passed into a tolerably strong solution of cyanide of potassium (exact strength not important); yet we have never met with the inconvenience complained of by your correspondent, "Mr. W. H. Walter" (whom, by the way, though of our name, we have not the pleasure of knowing). We should think, therefore, that that gentleman was not sufficiently particular in rinsing and wiping his glasses, especially at the edges.

Water containing much lime will not do for the purpose, as the soda causes a deposit of lime, which will sometimes adhere to the glass very tenaciously, requiring a dilute nitric acid for its removal. Perhaps this may have been the cause of failure. But, with moderately soft water, no inconvenience need be feared, if due care be used in rinsing the glasses. H. and J. Walter.

538, *New Oxford Street.*

HINTS FOR TOURISTS.

Sir,—It is with much interest I have from time to time read in the pages of your valuable publication, the "Photographic News," the various most amusing and most instructive particulars contributed by your correspondents, descriptive of their photographic tours, and the number of beautiful views they have taken by the various processes; but I cannot help, and have frequently remarked the absence of any allusion whatever as to the description of camera or lenses employed; whether they were taken by a twin lens, or the single lens camera, with Latimer Clark's table, &c., or some one other of the new inventions, or if any, what other description of camera? So popular has this interesting art become, and will certainly become far more so, I cannot but think and believe, that if those gentlemen, or any others of your numerous correspondents, would offer to your multiplicity of readers and admirers of the beautiful and interesting art, their observations as to the description of camera employed, with a few remarks upon the utility and manipulation of each, it would, I am sure, prove of valuable service, and of sound and useful information to a vast number of your subscribers and others, who already take a delight, and also to those who may be about to commence the practice of this most beautiful and interesting art. C. J. M.

CURIOSITIES OF PHOTOGRAPHY.

Sir,—I do not think the photograph of a criminal ought to be produced in evidence against him, as recommended in your 74th number. I have seen two likenesses of the same person, taken by the same lens, yet so different that they might be supposed, even by a professional, to represent different individuals. I think the expressions of the features, without exception, are altered in direct proportion to the duration of the sitting.

As a curious experiment on the *mesmeric* power of the lens (I suppose I may call it such), ask a nervous subject to remain particularly immobile, to keep his well-opened eyes with great fixedness on the lens; draw off the brass cap, and stare at the sitter, continually telling him to be steady, admonishing him to keep his eyes open, &c. The most horrid grimaces conceivable—winking, watery eyes, straining from their sockets, dreadful contortions of the mouth, and increasing paleness of the cheeks—attest the intensity of the mental disquietude, all of which is familiar, more or less, to every amateur; but it is not so generally known that a person stealing cautiously behind the subject might administer a good pinch, or prick him smartly with a pin, without his being conscious of it. A somewhat similar method of producing insensibility to pain is practised in some of the Paris hospitals, and has been noticed in this paper—the assistant holding a bright ball before the patient's eyes, whilst the surgeon *even* amputates; but it is necessary to success, that the patient should fix the attention, with all the energy of the mind, on the shining globe.

Edward B. Fennessy.

TO CORRESPONDENTS.

*** *A pressure of important matter compels us to omit the letter of Mr. Jennings. Our correspondents will oblige us by studying brevity as far as possible in their communications.*

H. T. T.—1. A full description of the method of recovering the silver from washing waters, &c., will be found at p. 267 of our first volume. 2. See the same paper also for a means of recovering gold. If sulphate of iron is added to a solution containing gold, the latter will be precipitated in the metallic state. 3. It will entirely depend upon the substance forming the stain, and the kind of material upon which it has fallen. Try dilute carbonate of soda.

Mr. Vernon Heath will find, on reference to our report of the late meeting of the Photographic Society, the following passage:—"It being understood that the report (of the Collodion Committee) should be regarded as the opinions of the gentlemen signing it, and only on the specimen of collodion which had been submitted to them." Mr. Heath will perceive, therefore, that the publication of his letter is unnecessary.

James Lugg.—Your trouble arises from bad manipulation; if you have made your bath carefully, do not tamper with it. See, by test paper, whether it be neutral or acid. The lenses by the maker you name are quite as good as those of any other maker at the price.

William.—Allow a strong solution of cyanide of potassium to remain in contact with the dirty surface for several hours, and then after washing, soak in dilute nitric acid. Well wash afterwards.

Theta.—The print is beautiful; the colour is as fine as any we have seen. Your letter was received, with many thanks, and has been forwarded to its destination.

A Tyro.—We cannot refer you to a better description than a very detailed account of the methods of constructing a photographic glass house which recently appeared in our columns.

Lorimer.—See our first volume, pp. 268, 274, 282, 293, at all of which places will be found useful information on the subject of the reduction of silver residues.

G. H.—We cannot answer the question without more specific information. It is possible that the lens, collodion, and bath, may be each in fault.

G. Maull.—The specimens of paper, and pictures printed thereon, are excellent. We should be glad of further information on the subject.

Z. Charayabonyanski.—We hope soon to be able to give some information on the subject. It is a dry process on glass.

J. Parker.—Received. Your name shall appear in our next list, which we hope soon to publish.

C. M.—Alcohol and spirits of wine are the same thing; the former term is, however, used to express a stronger article than the latter.

F. Y.—See Mr. Simpson's articles on the subject in Nos. 72 and 73 of the "Photographic News."

Watkin.—Some articles on the subject appeared in some of our early numbers. Consult the index of vol. i.

An Invalid.—Your description is not sufficiently clear for us to say whether your camera is complete or not.

J. Thompson.—The two sheets of paper are to be pressed back to back between the glasses, with a piece of yellow paper between.

H. G.—You must be mistaken in attributing your failures to dirty glasses. The bath is, most likely, in fault.

Rochester.—Filter the bath, and add some fresh nitrate solution.

T. S. K.—Received.

Photo.—Caustic ammonia.

W. H. Fox.—We know nothing at all on the subject referred to.

B. C. H.—We do not think there is any foundation for the report.

G. W. Wilson.—Received with thanks.

*** **All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard. Private letters for the Editor, addressed to the office, should be marked "private."**

THE PHOTOGRAPHIC NEWS.

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ON COMPOSITION AND CHIAR-OSCURO.—II.

BY MR. LAKE PRICE.

"There were giants in those days."

Emerging from the long darkness which had succeeded the downfall of the Arts since the classic era, the sixteenth century beheld their regeneration, with an astounding power, which appeared as though all their slumbering energies had only accumulated in order to produce, in a galaxy, talents such as the world had never beheld flourishing at the same time, nor probably will ever see again. Nor is our admiration lessened when we consider the state of the fine arts in the period antecedent to this remarkable epoch.

During the middle ages the arts of painting and sculpture had been usually practised by illuminators of missals and breviaries, by chasers in metals, workers in stained glass, and carvers in wood, ivory, and stone, who carefully elaborated works—many of which have descended to our times—which show that however rude and barbarous, according to our modern notions, the domestic habits of the period may have been, that the nielli, goldsmiths' work, the weapons, armour, carving, enamelling, &c. &c., were of an infinitely higher artistic standard than similar objects in our days. Patient workers were those early "Maestri." They are to be seen in illuminations of the time, by lamplight, surrounded by their scholars deep in their various occupations; here it is the hilt of a dagger or rapier that is being chased, or a bronze that is being tooled; there a saint or Madonna cut out of wood or marble; whilst the juniors are busily occupied in drawing by a twinkling taper from an antique. From the "bottega" or shop, such as we have described, of "Messer Lorenzo Ghiberti" came those bronze gates of the Baptistry at Florence, doubtless familiar by casts to many of our readers, of which Michael Angelo said, "They should have been the gates of Paradise." Such, we repeat, although we do not ignore the existence of Giotto, Fra Angelico, &c., was *mainly* the state of art towards the latter part of the fifteenth century, when astonished Europe beheld, during the short lapse of fifty years, the talents of Michael Angelo and Raffaelle, of Lionardo da Vinci and Titian, of Corregio and Giorgione, of Paul Veronese, Albert Durer, Holbein, &c.

It possibly may never have occurred to many of our readers to reflect on the enormous and varied mental exertions of most of the distinguished men abovenamed; in our day, if a man be a clever portrait, landscape, or cattle painter, he goes no further; at the *renaissance*, it was far otherwise. Michael Angelo was an architect, and designed the glorious "Cupola," and St. Peter's; he was civil and military engineer, sculptor, and painter! and it is hard to say as which he most excelled; Lionardo was painter and engineer; Albert Durer was painter, engraver on metal and on wood, author, &c. Truly they were a wondrous band, and fitly were they honoured by their contemporaries. Lionardo breathed his last in the arms of Francis I., of whom he was the honoured guest. Charles V., King of Spain and the Indies, and Emperor of Germany, stooped to pick up the pencil of Titian; and even our own bluff Hal, although his kingdom lay remote from the influences of art, felt, and said, that "He could create a lord, but not make a Holbein;" whilst the death of the "divine" Raffaelle was felt and mourned by Pope, princes, and people, as a national calamity.

Owing little to colour or chiar-oscuro, the works of the Roman, Bolognese, and Florentine schools seem as though their grand and chaste creations would suffer were they dependent upon them for their impression on the spectator. Having constantly under their eyes the statues and *bassi relievi* of the classic era, many of which were recovered from the ruins of Rome during their time, to these they ceaselessly turned with loving emulation, the conceptions of these masters in their highest flights of genius are the grand Epics of pictorial art, which cannot be *understood*, much less appreciated, by the uneducated eye. They are "caviare to the general"—the finish of a Mieris or Gerard Dow is a class of art of which the untutored mind can fathom the excellence; but the grand though grim Prophets and stern Sybils of the Sistine Chapel, and the Judgment, dimly seen through three centuries of decay, require *reiterated* and most careful observation, even by the artistic beholder, before their ever-increasing power stamps them upon his mind as the master productions of human intellect.

The chief artists of these schools are Michael Angelo, Raffaelle, Daniel de Volterra, Julio Romano, Domenichino, The Caracci, Guido, Guercino, Andrea del Sarto, &c. The great works of the first are frescoes in the Vatican, as is also the case with Raffaelle; but pictures by the latter are to be found in almost every country in Europe—at Rome, Florence, Madrid, Dresden, in England, &c.

Parma boasts in Corregio one of the greatest artists of the world; the exquisite delicacy of his conceptions, his soft and harmonious colouring, combined with a masterly chiar-oscuro, render a pilgrimage to Parma necessary to the art-traveller in Italy. His "Notte," which has suffered much, is at Dresden, but the St. Jerome, called "Il Giorno," or the Day (light), still remains, meriting well its appellation; for it is a fact, that at dusk, when the gallery becomes obscure, this picture remains visible longer than any other. This and his other pictures and frescoes have been nobly engraved by the Cavaliere Toschi, who has devoted most of a lifetime "to their service." Parmegiano is elegant in his conception, but too often degenerates into affectation and mannerism.

The Venetian school is distinguished by the voluptuous richness and harmony of its colouring; the pictures of the masters of this school are not noted for that purity of drawing, for that elevation of conception, for that intensity of expression, or correctness of linear composition, that is seen in the Roman, Florentine, and Lombard schools; and as their principal charm, colour, is unattainable in photography, we will pass onward, merely mentioning that Titian, Giorgione, Tintoretto, Paul Veronese, are the great masters of Venetian art; and that the portraits of Titian should be most carefully studied when opportunity offers.

Lombard Art shows its highest excellence in Lionardo da Vinci, the purity and elevation of whose talent contributed to form that of Raffaelle. His masterpiece, the "Last Supper," is well known to our readers by engravings. Luini is an artist hardly to be judged out of Milan, where most of his frescoes and many of his pictures exist.

The Spanish School.—The great artists of Spain produced their masterpieces under conditions widely different from those which had influenced the elevated conceptions and idealised expressions of the Italians. On the expulsion of the Moors, the Church in Spain monopolised the efforts of the artists; of sculpture there were no classic examples to refine the taste, and that of the period was confined entirely to images of the Virgin and Saints, whilst the gloomy

ascetics of the cloister furnished models for the canvases of Zurbaran, or suggested dark legends of martyrdoms for the pencil of Ribera. But for the genius of two men, Spanish art would have ranked low amongst the schools of Europe. Their redeeming excellencies have placed it second only to that of Italy. Murillo and Velazquez are the great artists to whose works Spain is indebted for her position; the first, although he never attained to the sublime refinement which distinguishes the works of Raffaelle, has left pictures of exquisite quality, uniting an harmonious colouring with great feeling for light and shade, and a most tender and graceful treatment. His countrymen say of him, figuratively, that he painted "con sangre y leche"—"with blood and milk"—so true to nature is he.

The art of Velazquez, unfortunately, is not to be seen and judged out of Madrid; exclusively employed by Philip IV., almost all his pictures adorn the Museo of that city. He is the first of portrait painters; simple, natural, and unaffected, his figures stand before the spectator, living embodiments of the "*caballeros*" of the Court of Philip. His equestrian portraits, of life size, are matchless and unique, whilst a judicious degree of finish is accomplished with great apparent facility.

Dutch and Flemish.—The works of this school are generally distinguished, in their cabinet specimens, by a minute and precious finish, and have qualities which permit a much nearer approach, by photographic means, than the elevated and imaginative art of the Italians; whilst at the same time, in Rembrandt we see the wondrous power that his complete mastery of chiar-oscuro gives him of investing the most commonplace images or defective drawing with a solemn and impressive grandeur. In Terburg and Metzu, Jan Stein, Mieris, Gerard Dow, Teniers, Ostade, de Hooghe, &c., we find qualities which will repay the student for a diligent investigation of their works. They are mostly scenes of the ordinary life of their country and epoch, touched with a free and admirable pencil, in spite of a degree of finish which might, in less talented hands, readily have degenerated into insipidity; but which in theirs, owing to their consummate skill in execution, and knowledge of light and shade, &c., has preserved all the brilliant freshness of less laboured productions.

The landscape and marine painters of this school are numerous. In the pictures of Cuyp, Ruysdael, Both, Wynants, Everdingen, Hobbima, Backhuysen, and William Vandervelde, we see what assiduous study and close painting up to nature will accomplish, even when directed to scenes not remarkable for the grandeur or sublimity of their sites. By Cuyp sunlight is represented with the truth if not the elegance of Claude; and in Both we behold the refinement of Italian climate and art superposed on the original Flemish nature; whilst the subjects of animals of De Laer, Karel du Jardin, Adrian Vandervelde, Wouvermans, and Berghem, the still life of Weenix and Fyt, and flower-pieces of Van Huysum, are all of great excellence.

In Rubens, we behold a most prolific invention, which anon runs riot among Silenuses, Fauns, and Dryads; is at home in depicting the courtly events of Henri Quatre's career, the mournful phases of the "Crucifixion," landscapes, portraits, &c., with a pencil, whose exuberant power has never been exceeded, if its taste in the Flemish *contours* of its forms may be questioned. In emulation of so great an example, Vandyke, his scholar, is one of the greatest portrait painters, whilst Snyders and Jordaens contribute their talents at a humbler distance.

France was more apt at availing herself of the talents which the "Cinque Cento" had produced on the other side of the Alps than England. Francis I. invited to his court, and largely patronised, Lionardo da Vinci, Primaticcio, and Benvenuto Cellini, &c.; consequently, the French school can boast of Jean Goujon, Simon Vouet, Le Sueur, Gaspar and Nicholas Poussin, and Claude, all from 1550 to 1700; and, doubtless, apart from the genius of the people, this early intelligence in matters of art has largely contributed to the taste displayed for these last two centuries by the French in all their manufactures.

German art rose suddenly, in 1500, from the coarse imaginings of Wolgemuth and Gothic style of Cranach to the skilful touch and delicate graver of Albert Durer, and characteristic pencil of Holbein, but it remained until our own time dry, peculiar, and unsatisfactory to the admirer of Italian art.

England was tardy in commencing the practice of the fine arts; she was, during the reigns of Henry the Eighth, Elizabeth, James, and Charles the First, dependent upon foreigners for the very portraits of her monarchs; and to the pencils of Holbein, De Heere, Pourbus, and Mytens, &c., we are indebted for the distinguished characters of the Elizabethan era, whilst of the greatest genius England ever produced, Shakespeare, we have but effigies of very doubtful authenticity. Unfortunately, the first enlightened appreciation of the arts was frustrated by the fate of Charles the First, and his noble collection was dispersed. During the civil wars and commonwealth the arts languished. In Lely we have a certain degree of elegance and a skilful pencil, but a meretricious style well adapted to the court he painted. Hogarth must be considered the father of the English school, original in his conceptions, and powerful in his execution; his best examples are masterly productions, strictly national, and which have given the tone to our subsequent art. In Reynolds, we possess one of the great artists of Europe, who ingrafted on his own talent many of the excellencies of the older masters; whilst in Turner, we boast, with justice, the most consummate landscape painter that has ever existed. The works of Gainsborough, Wilson, Lawrence, West, &c., are doubtless more or less familiar to most of our readers; and happily, our living artists can, at the present moment, show a combination of talents such as at no one time has been seen in our country.

We have thus given, as far as a *very limited* space will allow, a slight sketch of the rise and progress of pictorial art, of which we can speak from personal inspection in the different continental galleries. It may be useful in introducing the subject to some who, heretofore, have had little acquaintance with it. In our next, we will proceed to examine the means adopted by most of these great talents.

(*To be continued.*)

THE PHOTOGRAPHIC EXHIBITION.

FOURTH AND CONCLUDING NOTICE.

We must not close our notice of the Exhibition without mentioning the pictures exhibited by one who, as regards skill and reputation, stands in the foremost rank of photographers—we allude to Mr. Lake Price. The subject of his prints is one which is at all times interesting to every person, and is especially so at the present moment. They are views of Rome, photographed by him expressly for the London Art Union, and give one a clearer idea of the present appearance of that city than any description could convey, even if embellished with illustrations. As prints they are very fine, and in respect to gradation of tone and general appearance, may compare with the best in the room.

With, we believe, one exception, we have said nothing of a set of photographs, which are inferior to none in the Exhibition, as regards their quality, and which possess a peculiar interest from the scenes they depict. These are the works of the Brothers Bisson, who, nobody will deny, are worthy rivals of our best photographers. Almost all the prints they exhibit are views taken among the Alps, and under circumstances which, one would have thought, offered insurmountable obstacles. From the accounts given by those who have made the ascent of Mont Blanc, to merely ascend the mountain is very difficult; but a photographer desirous of getting a picture of a particular scene is not easily daunted by difficulties; and therefore we are not surprised that the desire of getting photographs of these savage regions of snow, ice, and rocks, should have

nduced the Brothers Bisson to encounter them, when success would enable them to exhibit the most extraordinary prints ever seen. We who practice the art, can alone appreciate the difficulties under which these pictures were obtained. The intense cold which prevents water from existing in a liquid state in these regions, must of itself have been an almost insuperable difficulty to the practice of the wet process; and though it is not stated that this was the process employed, there are appearances which induce us to believe that it was. That a moderate degree of cold, while it renders a longer exposure necessary, does not prevent a good picture from being obtained, we have ourselves found; and one in the present Exhibition, taken by Mr. Fenton on the 23rd December, is an evident proof; yet, the cold we experience here is so very far from being as intense as on the sides and summit of Mont Blanc, that we cannot help feeling surprised that the negatives could have been taken at all, much more that they should have been so perfect. In most of these pictures there is, of course, little half-tone, the objects depicted being the dark sides of the mountain, and the white masses of ice; but where it is otherwise, we do not find the scene less perfectly rendered. Where all are so good, it is difficult to select any particular one for praise, and if one is more pleasing than another, it is on account of the subject, and not from any superiority in manipulation. In their principal features they resemble each other; there are masses of ice, jagged peaks of the mountains, and drifted snow, in all of them; but there are two in especial which have something more than this—these are the views of "The Grand St. Bernard," and "The Ascent of Mont Blanc." In the former, we see the celebrated Hospice where so many travellers have been saved from perishing, and there is only one thing wanting to render the picture of the highest interest, and that is, a group formed of a monk and one of the St. Bernard dogs. "The Ascent of Mont Blanc" represents a number of men scattered about on the ice. Some are standing on blocks of ice, from which they are stretching out their alpenstocks to assist others in reaching them; others have already reached the plateau, and are looking down at those who are following them. Their figures and attitudes, by the idea of life which they convey, form an admirable contrast to the ever-frozen objects among which they are seen, and, besides, give an excellent idea of the immense magnitude of these objects. Considering the desolate nature of these regions, the photographers have exercised a sound judgment in reproducing them without figures; but, on the other hand, by doing so, they deprive the spectator of the power of realising so readily the vast extent of the scene depicted. The figures, too, are well arranged; their attitudes are natural, and they have not the statue-like appearance which is very frequently seen in photographs in which figures are introduced.

Another view of "Conway Castle," 306, by S. H. G., is a small but beautiful picture; the definition is excellent, and the gradation of tone all that can be desired. 308 and 309 are two prints by Lyndon Smith, which, like all this artist's pictures in the Exhibition, arrest the attention of the spectator very strongly, generally to lead to his disappointment. The first is called "Study in the Valley of Desolation—Two Hawthorns." It is well that the catalogue states that they are two hawthorns, for otherwise the spectator would have been just as likely to have supposed them to be holly bushes, or, indeed, any other tree, if he were unacquainted with the various outlines which different varieties of trees present. The second print, "The Approach to Bolton Abbey," is especially attractive at a distance, from its size and general appearance; but the moment it is looked closely into, the illusion vanishes, and we see nothing better than a very good lithograph, which is the same thing as saying, a very indifferent photograph. Considering that almost all the prints exhibited by Mr. Smith present this unsatisfactory appearance, it is well for his reputation that he has likewise sent the "View of Knaresborough," which differs so widely from all the rest. Mr. Joubert exhibits specimens of what he calls the Phototype Process. Two of these are copies of line engravings, and are very good. It is possible that this process may prove a valuable one, but we have not sufficient information respecting it upon which to found an opinion. Hennah and Kent's print, containing the portraits of "England's Twelve Champion Cricketers," attracts a good deal of attention. The portraits were taken on board the steamer, which we suppose to be that in which they made their voyage across the Atlantic. The portraits are very good, but the appearance of the print is marred by the blurred aspect of the rigging, and we think it would be much improved if this were stopped out altogether, for though people see that the men were seated on the deck of a steamboat, they will not be likely to remark the absence of rigging at that particular part of the vessel. A view of the "West Towers of Lincoln Cathedral," by James Mudd, is a very nice picture, and loses nothing by contrast with those which surround it. 339 is an excellent picture of one of the great natural curiosities of the Isle of Wight, "Black Gang Chine." This was taken by A. J. Melhuish, and is worthy of his reputation as a photographer. The lights and shadows are well rendered, and there is great clearness and definition throughout the whole picture. This was taken by the collodion process; but the companion print, "Plymouth, Devon," shows that he is equally at home with the oxymel process; while other views, taken by Norris' dry collodion process, prove that it matters little to him whether he employs one process or another. A photograph of "Bramshill," in Hampshire, by Lord A. Churchill, makes us acquainted with a style of architecture which, we believe, is seldom seen in this country The print is good so far as the building is concerned; but the dark, heavy appearance of the sky so overpowers it, that its merits are not so readily distinguished as they would otherwise be.

The length to which our notices of the Exhibition have extended, renders it necessary for us to give but a brief account of those pictures which are hung on the screens, as well as of some others which arrived too late to be hung at all. Among these are some extremely interesting pictures, which are highly creditable to the photographers by whom they were taken. We have here views of "The Falls of Niagara," which exhibit great merit in every respect, and convey a very good idea of the wonderful appearance of the scene. "A Lady's" pictures occupy a rather conspicuous position, from their number and choice of subject, and attract a good deal of attention. Some of Mr. Robinson's pictures likewise occupy a space on the screens, and we are glad to observe that they are far better than those we criticised in a preceding article; that entitled "Here They Come!" being so much superior, both as regards manipulation, the manner in which the figures are posed, and the expression of their faces, to the print "Preparing to Cross the Brook," that nobody would imagine it to be by the same artist. Mr. Sedgfield exhibits some stereoscopic pictures, which possess the beauties which distinguish his productions; and the London Stereoscopic Company likewise has a frame containing views of picturesque scenes in different parts of England, besides a similar frame of stereograms of American scenery and subjects, including Niagara, and Blondin in the act of crossing on the tight-rope. The same company also exhibit an upright pillar stereoscope, which enables two persons to examine the pictures it contains at the same moment. How many stereograms there may be in one of these ingenious and handsomely-finished instruments we have no idea, but the number must be very considerable, for we turned the handle which brings them into view until we were obliged to desist from sheer weariness, and even then we had not seen them all. The frame numbered 550 contains four portraits printed from negatives taken at night, by means of Moule's artificial light. As portraits, they possess considerable merit; and the gradation of tone which they exhibit proves that night photography may now be practised with success;—indeed, the frequency with which we observe the

announcement that "portraits are taken hereafter dark," leads to the inference that this fact is very well known to London photographers. It might be supposed that the employment of artificial light would necessitate a long exposure, but this is not the case; the inscription on the portraits exhibited states that the exposure was 10 to 12 seconds, and we have seen portraits taken by Mr. Moule himself, in which the exposure did not exceed this period.

Some of the prints exhibited were sent too late to be inserted in the catalogue, and among them we must not omit to mention those by Gabriel de Rumine. As photographs, many of them are very beautiful, the views of Athens and of the Acropolis especially; but their chief interest, to those who are familiar with the history of ancient Greece, lies in the fact that they are faithful representations of the present appearance of buildings once renowned throughout the civilised world for their splendour and magnificence.

Of the pictures on the screen, 427 and 446 are subjects more worthy of Mr. Vernon Heath's reputation than that of the "Memorial Church," already noticed.

Among the curiosities of the Exhibition are a couple of maps, photographed by G. Downes, one enlarged, the other reduced, and no stronger proof need be asked for of the value of photography for copying maps or plans. In the lesser, as in the larger one, we find every name perfectly legible. Mr. Rippingham sends copies of a page of music, enlarged and reduced from the original. The subject is a glee, and we have the words and music rendered with as much distinctness as existed in the printed sheet, from which it cannot be distinguished in colour or general appearance.

Arranged on tables, in different parts of the room, are stereoscopes containing pictures by Claudet, Williams, Heath, and Fry, which offer great attractions to visitors, by whom they are inspected with much interest.

We should be glad, if our space permitted it, to give a detailed notice of many interesting prints which we have not mentioned, but, as we cannot do that, we shall close our notices of the Exhibition by a few general observations.

The present Exhibition, though possessing no extraordinary attraction, we consider, on the whole, to be quite equal to that of last year. The number of good prints is considerable, as may be gathered from what we have said respecting them, and there are very few which can be pronounced positively bad.

The process employed in taking most of the pictures exhibited is wet collodion. There are, however, specimens of most of the dry processes, including the Taupenôt, the Fothergill, the Oxymel, and that of Dr. Hill Norris. Of these the greater portion were taken by the Taupenôt, or collodio-albumen process, as it is generally called, Mr. Mudd and Mr. Fisk Williams being the largest contributors of pictures taken by this process, but the best of them do not surpass, if even they equal, some of those taken by Mr. Rosling, especially one or two of those in frame 71, which escaped our attention when we examined the prints in that part of the room in which it was hung, owing to the number of people present at the time. The inference we draw from the prints taken by the different dry processes is, that it is of little moment which of them is employed, provided the operator adheres to it. For those who do not like the uncertainty and trouble of preparing their own plates, there is the Dry Collodion Plate Company, which employs Norris' process; but to those photographers who intend to prepare their own plates, we recommend either the collodio-albumen or the Fothergill process. The results obtained by the wet collodion have hardly any superiority over those obtained by the Taupenôt process, and, in some instances, none at all, while we have ample evidence that the Fothergill process, in the hands of certain persons, is not in the slightest degree inferior.

In conclusion, we may mention, for the information of our readers who reside in the country, that in the event of their desiring to obtain any of the pictures we have mentioned, we have no doubt they may do so by addressing a letter to Mr. Thomas, the gentleman to whom the gallery belongs in which they are exhibited.

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. L. BOURNE.

In his preliminary observations, Mr. Bourne remarked that he had nothing very new or abstruse to offer, and that his remarks were addressed rather to the novice in the photographic art than to the adept. Although the Society had been established a year and a half, this was the first meeting at which a paper had been read, or at which the art of photography was discussed; consequently, the Society is yet young in photographic experience. Under these circumstances he thought it would be out of place to bring forward anything that required a considerable amount of photographic experience to understand, and as the committee wished him to make his paper popular as well as practical, he thought he should best carry out their wishes by selecting a subject which, while it should be second to none in importance, would yet be suitable for a first paper, and capable of being understood by all; useful and acceptable to a mixed audience, composed of photographers and non-photographers. Mr. Bourne then continued:—

It may serve to elucidate the subject if I divide it into two parts, viz.—the photographer, and his materials,—and consider what conditions are requisite in both.

To begin with the photographer. A person totally unacquainted with the elementary principles and *modus operandi* of photography, while he might have some vague and indistinct notions of its being a wonderful and mysterious art, would yet estimate very slightly the requirements of its followers, were he to form his opinion from his personal knowledge of some of its professors, and from the productions they so generously displayed to the public. An individual who should contemplate "those abominable distortions of humanity" and nature which he finds conspicuously dangling in smutty cases in every street and alley of our large towns, would certainly find but little difficulty in coming to the conclusion that photography was an art capable of giving nothing but wretched caricatures of "the human face divine," and that nothing was required of its professed followers but total ignorance of all knowledge of art, and an absolute want of taste.

Photography being a *novel* discovery, and the rapidity and cheapness with which these so-called likenesses could be produced, the public, seized, as it were, by a portrait mania, bestowed upon the new art a patronage unparalleled in the history of any other discovery; so that at the present time there is, perhaps, not a house in the kingdom in which its productions cannot be found. This great popularity induced numbers to rush into—what shall I call it?—the profession? whose previous training had been anything but what we should imagine an artist would require; hence the uncouth nature of many of its productions.

But this great popularity also gave rise to another evil. It produced in the minds of some a fear lest it should overturn some time-honoured institutions already existing; and as a great outcry is always raised in such cases, photography formed no exception to that class of grand discoveries on which abuse and odium have at first been heaped by those persons whose interests they most closely disturbed. Artists of every class have stigmatised it as a purely mechanical art, and as unworthy to approach even the threshold of their own exalted and mysterious domain. From an innate dread lest the high and sacred province of art, in which it was their peculiar prerogative to move, should be desecrated by unhallowed and unconsecrated footsteps, and

* Read before the Nottingham Photographic Society, Jan. 31, 1860.

from a dreadful alarm lest its sacred mysteries should become the property of a vulgar populace and unsanctified hands, and produce something which an unrefined public might consider equal to their own mysterious creations, they have exerted all their energies, and tried every means to separate it as far as possible from the frontier of the high region over which they are pleased to consider Heaven has called them to preside. I shall not stop now to consider how much of this alarm is unfounded, or whether this purely "mechanical invention" is deserving a higher place than artists are willing to assign it. I am content to let it fight its own way, and commit its interests to the common sense and impartial judgment of mankind, in the confident assurance that whatever merits it may possess will ultimately find their proper level.

Perhaps you will consider this a digression from my subject, but I think it has an important connection with it. Photographers will see that if the art which they so much admire is to rise superior to the hostile criticism of those who are jealous of its growing popularity, and if it is to wipe off the disgrace which has hitherto justly attached to it, they are the parties on whom the important task devolves, and they must show themselves equal to it by cultivating those peculiar qualifications which shall enable them to produce works which artists shall not only fail to condemn, but which they must of necessity admire.

What, then, are these qualifications? In the first place, no photographer will ever travel very far in the pathway of success, unless he devotes to the pursuit of his art a considerable sacrifice of time, and no small amount of hard and laborious exertion. However easy a matter the taking of a photograph may appear to some, those who have had a tolerable degree of experience in it know that it is not such a very easy matter, after all. These pictures, unlike those produced by pencil or brush, are not obtained by taking your portfolio of drawing-paper, and seating yourself comfortably in the cooling shade of some overhanging tree for a few hours on a delicious summer afternoon, and which a few finishing touches in your own study at home are all that is necessary to complete. No; to produce a finished photograph, which shall charm every beholder by its inimitable beauty and absolute perfection, a far different class of operations is demanded.

Many a long and weary hour must be spent in mastering the theory of those subtle chemicals by whose magic properties, in conjunction with the sun's own pencil, the mysterious result is produced. Many a time must our bones ache with rubbing and polishing to a marvellous degree the surface of the tablet which is to receive the delicate impression;—many a time must we be imprisoned in the dark closet with scarcely a breath of air, inhaling the suffocating odours which load its circumscribed atmosphere, as we proceed by its sickly light to go through again and again the mysterious operations of coating, sensitising, developing, and fixing a plate. And when, with sore and weary feet, we have travelled far over hill and dale, searching for the picturesque, in the broiling heat of a summer's sun, we return home with our burden to commence the long and tedious work of development, many a sigh must we expect to heave as we see, perhaps, the result of our labour in nothing but a mass of dirty stains and patches, with only here and there a perfect bit of the lovely landscape we so much wished to perpetuate. Or, if we wish to make sure of our pictures on the spot, and lug about a huge tent and a score or two of bottles, in addition to what is required for a dry process, the thing absolutely becomes the work of a slave. Great as is my liking for photography, I confess that were I always compelled to adopt the latter expedient when I wanted to take a picture far away from home, my journeys abroad for that purpose would be something like angels' visits—"few and far between." How many photographers could relate pleasing narratives of certain not over-pleasing incidents connected with their pictorial wanderings!—how, being mistaken for a pedlar, they have been told, when about to plant their camera to take a view of some curious old farm-house or uninhabited ruin, that they need not unpack their traps, as there was "nothing wanted;"—how many times they have had to mourn over an upset bath of nitrate of silver, or a collodion bottle from which an ejected stopper has allowed all the precious fluid to escape;—how the perspiration has streamed from them as with lightning rapidity they popped in and out of the suffocating tent;—how some curious bull, anxious to know the contents of the suspicious-looking camera, has playfully employed his horns to lift it up for that purpose; and how they have stood looking on in silent and pensive amazement, while a gust of wind has sent tent, bottles, and camera on a rolling expedition down the mountain's side. Such are a specimen of what every photographer may expect to meet with and undergo, in the ardent pursuit of his favourite study. Those, then, who imagine that photography is nothing more than a pleasant and idle pastime, are likely to find themselves greatly mistaken when they make trial of it. And that class of ease-loving gentlemen who, if photography could be practised in the drawing-room either by the "gin and water" or the "wet" process, would make the best of photographers, will find little in the art suited to their luxurious inclinations (except the expense); and the odious black stains on their white and delicate hands will soon cause them to relinquish it in disgust.

Another indispensable condition of success is *resolute and untiring perseverance.* Perhaps you will think I need not have named this quality, as it is indispensable to the accomplishment of any object. That I am well aware of, but the photographer requires it in a *special degree.* And this is the grand test of the genuine photographer, for, unless he has a real love for the art, and the labour which it involves is a pleasure rather than a task, the thousand and one difficulties he will meet with, and the innumerable failures he is doomed to experience, will be sufficient to quench the hope he once indulged of success, and cause him to give it up in despair.

Those persons who are simply admirers of the art, and unacquainted with its operations, as they contemplate some finished and perfect specimen, enchanted with its wondrous truthfulness and delicate rendering, have little conception of the many baffled attempts, and the long career of well-fought experience, which the artist had to pass through before he could produce the matchless gem. The same may be said of photography as was said of knowledge—"there is no royal road" to its acquirement. It must be by patient and plodding working, step by step, marked ever by close and careful observation, and a keen detection of the causes of failure. For I need not tell those who have had any experience in the art at all, that failures form an overwhelming majority of their earliest and even later efforts, and that both patience and perseverance are often put to the severest test. Perhaps there could not be found a single photographer, who has attained to any degree of proficiency, who has not more than once or twice thrown aside his camera, and resolved, as he emerged from his dark room, the subject of a new disappointment, that he would never enter it again. How often has it happened that, when we made most sure of success, we were the least successful? We have renewed our attempts with the determination to be more careful in every particular, and have met with a similar result. We change the collodion; now we are certain to succeed; no, as far from success as ever. But we will not be beaten; and, like a candidate at an election, are determined to make the silver fly; so we mix a new bath of that material, but, alas! perhaps, like the same candidate, we are disappointed after all. What infernal demon, we are ready to ask, has bewitched the whole concern, and, taking advantage of the dark chamber, sits laughing at our misfortunes? What is up with the collodion? What has got into the bath? What provoking cause persists in smearing our carefully cleaned plates with stains of every shape and size? Whence these showers of stars, comets, and meteoric stones, that sweep across our skies? What *can* be the reason that camera, collodion, and chemicals have all

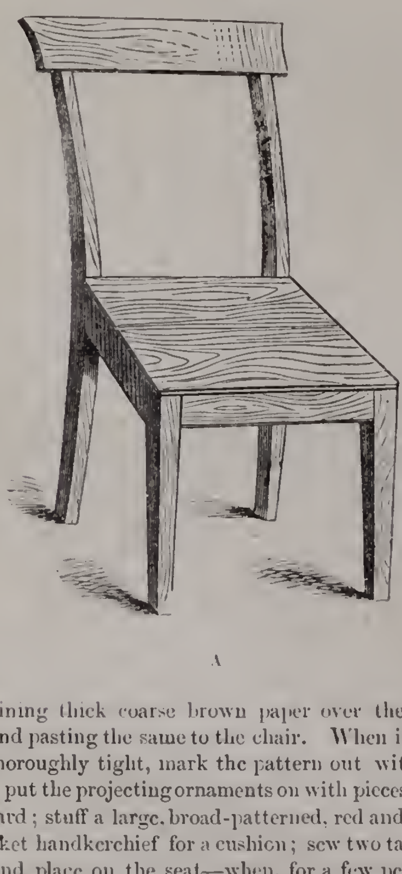
combined to frustrate our efforts and prevent our success? Some cause or causes for all these annoyances of course there must be; but where they reside, and how to avoid them, can only be ascertained by continued and unwearied efforts on the part of the photographer, and by carefully noticing the peculiar character of every failure; so that, whatever else the photographer may or may not require, he must possess a character opposed to indolence, and largely endowed with a dauntless spirit of perseverance.

(*To be continued.*)

BACKGROUNDS—HOW TO PAINT AND ARRANGE THEM.

FURNITURE, &c.

Any old kitchen chair may, for a few pence, be made to do service in place of an elaborately carved and expensive one, by straining thick coarse brown paper over the back and front, and pasting the same to the chair. When it has dried itself thoroughly tight, mark the pattern out with vandyke brown; put the projecting ornaments on with pieces of cut-out mill-board; stuff a large, broad-patterned, red and white cotton pocket handkerchief for a cushion; sew two tassels to the same, and place on the seat—when, for a few pence, and a little ingenuity, you will have a chair as sketch A, transformed into a chair as sketch B. High-backed chairs, low-backed chairs, or any style of chair, may, by the addition of profile pieces of millboard, and the dexterous use of vandyke brown and the brush, be transformed into serviceable and ornamental pieces of photographic furniture. Ottomans, foot-stools, and similar appendages to the chair may be constructed in the rudest manner of pieces of rough wood, or of old boxes, covered with any figured stuff, as calico, chintz. If a suitable contrast of colours is secured, a pleasing variety of pattern will be obtained.



A

B

GENERAL OBSERVATIONS ON PHOTOGRAPHIC POSITIVES.*

BY MESSRS. DAVANNE AND GIRARD.

ACTION OF THE POSITIVE PROOF UPON THE FIXING AGENT.

This portion of our task, the chief aim of which is to discover the causes of the changes which take place in the baths, would at first sight appear to present great difficulties; but the researches described in the preceding portion of this essay have very much simplified the phenomena under consideration.

Having entirely abandoned cyanide of potassium, there only remains for examination—with reference to the alteration of the fixing agents—ammonia and hyposulphite of soda. The first of these presents no difficulty. As to the second, the facts already established render the examination easy.

We will first consider ammonia. This re-agent exhibits no chemical decomposition after it has served to fix a large number of proofs: a simple solution of the salts of silver takes place—salts of silver which the bath removes when it has ceased to be in contact with the proofs. But this solution does not go on indefinitely: it has its limits. A quart of commercial ammonia dissolves about two ounces and a quarter of chloride of silver, but the quantity dissolved must necessarily depend upon the strength of the solution of ammonia; therefore, when the ammonia-bath becomes saturated with the silver, it is no longer safe to use it, for if a proof is placed in such a saturated solution, the latter will still dissolve *nitrate* of silver, but not *chloride*, and consequently fix the proof in a very imperfect manner. Moreover, if the bath, without being completely saturated, yet is near the point of saturation, it may happen that, even during the time the proof is immersed in it, the evaporation of the ammonia still going on, the bath will become less energetic, and apt to dissolve a less quantity of chloride of silver. This salt will therefore be deposited either on the proof or

* Continued from vol. iii. p. 272.

in the substance of the paper, and no subsequent washings in water will remove it; and when the picture is afterwards exposed to the light, it will blacken all over. Therefore ammonia, besides its disagreeable odour, and the injurious action it exercises on the "sizing" of the paper, has still other inconveniences. Ammonia baths, as well as hyposulphite baths, become old; they are free from all danger of sulphuration, but are liable to that of depositing chloride of silver on the whites of the proof.

Still, it is possible to avoid these inconveniences, partly by calculating, for each solution of ammonia of a certain strength, the quantities of chloride and nitrate of silver it is capable of dissolving, and partly by never allowing a proof to remain long enough in the bath for evaporation to produce a deposit. Both for ammonia and hyposulphite of soda, we must previously determine the extent a fixing-bath can be employed, or, in a word, how many proofs it will fix.

As to hyposulphite of soda, the influence the proofs exercise upon it are easily determined. Whether we present to it nitrate or chloride of silver, the action is always the same—a double hyposulphite of soda and silver is formed (AgO,S_2O_2) $(NaO,S_2O_2)2$, which is dissolved in excess of hyposulphite. The point of saturation varies with the concentration of the bath, and can soon be determined; but in every case it is very quickly attained. It is upon this point alone that the alteration of the fixing-bath depends; for, so long as it is not reached, so long will the bath be unalterable; and it will keep, as experience has proved, entire months; but, immediately it becomes saturated, it must be considered old. It will still fix proofs, but inevitably alter them: it will deposit sulphide of silver either on the proof or upon the bottom of the bath, therefore it must be absolutely rejected. Besides, the deposit is excited by the action of light, as experience has shown; for two portions of the same bath, slightly super-saturated, being preserved, one in the light, and the other in the dark, the first was much more quickly altered than the second. The exposure of a bath in a wide shallow dish acts in the same manner, and we incur further risk by employing such baths in the ordinary photographic dishes.

When a solution of hyposulphite of soda has arrived at that state of continuous decomposition, it must be rejected, not filtered, for after filtration the decomposition continues, and the sulphide of silver is deposited anew. Still, by adding new crystals of hyposulphite of silver to the bath, we can communicate a considerable capacity for saturation. In this case, the hyposulphite does not dissolve the sulphide of silver, as some authors erroneously state, but it becomes capable of dissolving a greater quantity of double salt, and consequently, of fixing new proofs.

But we must not recommend this practice, for it involves uncertainty; it is better to proceed methodically, taking a solution of hyposulphite of soda of a certain strength, and fix in it a certain number of proofs, such as experience has shown us it can fix; besides, the bath must be considered useless *even before* it has attained the point at which it is saturated with the double salt of soda and silver, a point when it must be considered as *old*, and necessarily liable to alter the proof. The determination of this point will form the subject of our next paper.

(*To be continued.*)

Dictionary of Photography.

Lamp-black.—A form of carbon, the soot obtained by burning resinous or oily substances with a limited supply of atmospheric air. It forms an intense black pigment, used both in oil and water-colour painting, and in carbon-printing in photography. Mixed with lac-varnish it is used in blackening the interior of cameras, the inside of the tubes of optical instruments, &c.

Lead.—A well-known useful metal. Its protoxide forms salts with the acids, some of which are employed in photography, as the acetate, chloride, and nitrate. Acetate of lead, added to gallic acid, has been proposed as a developing agent for collodion negatives.

Leather.—The first photographic experiments of Davy and Wedgwood were made upon leather, and this substance is sometimes employed as a recipient of photographic images. Collodion positives are taken upon or transferred to black enamelled leather, as a support, instead of glass.

Lemon Juice.—The juice of lemons consists of citric acid, mucilage, and extractive matter. It is sometimes employed in photography, even in positive printing, where its presence cannot but prove injurious, after it has neutralised any free alkali that may be present.

Light.—An emanation from luminous bodies by which objects are rendered visible. The principal source of light is the sun. A ray of light proceeding from this luminary, and which appears white or colourless, when decomposed by a prism, is found to be composed of several colours which form the prismatic spectrum.

A ray of solar light consists of luminous rays, of calorific rays, and of chemical rays. It is the latter that effect those changes in bodies submitted to the action of light, which constitute the principles of photography. We can separate the various kinds of rays in the following manner: if a sunbeam is passed through a double transparent plate of alum and green glass, it loses its calorific properties; if it be transmitted through a plate of rock-crystal, smoked, the luminous quality of the ray is extinguished, but the heat of the ray passes freely; and if a ray of light passes through a mixture of chlorine and hydrogen, it loses its chemical rays.

By the action of the chemical rays bodies are decomposed and other compounds formed; thus the salts of silver are reduced to the metallic state; certain soluble substances are rendered insoluble; the combination of certain mixed gases submitted to its influence is affected, &c.

Lignin Cellulose.—A microscopical examination of the various constituent parts of vegetable bodies, shows us that they are composed of a cellular tissue, varying in form with the part of the vegetable under consideration. The cavities of this tissue are filled with very diverse matters; in wood, the sides of these cells are covered with a hard and brittle substance called *lignin*, which constitutes the fundamental material of the structure of plants, forming a large proportion of the solid parts of every vegetable. Lignin, when pure, is white, diaphanous, tasteless, insoluble in water, alcohol, ether, and in the fixed and volatile oils. It is met with in a pure form in paper, linen, and cotton. Dilute acids and alkalies exercise but little influence upon it, even at a boiling temperature. Sulphuric and phosphoric acids, when concentrated, attack cellulose, and cause it to undergo remarkable changes: they transform it first into a substance resembling dextrine, then into glucose. Fuming nitric acid (cold) combines with it, and forms an insoluble but combustible and explosive substance—gun-cotton (pyroxyline). Boiling nitric acid converts it into oxalic acid. Acetic acid has no action upon lignin. It is not coloured by iodine. In a solution of chlorine, it undergoes a kind of combustion. Dr. Schweitzer has recently shown that cellulose is soluble in certain compounds of ammonia and copper.

Lignin must not be confounded with *ligneous* or woody tissue, which is, in reality, cellulose, with other substances added.

There are no means of isolating lignin in a state of purity.

Liquor Potassæ.—A solution of caustic potassa in water. It is colourless, transparent, somewhat oily looking, without odour, but of an extremely acrid, caustic taste. It feels soapy when rubbed between the fingers, is highly alkaline, forms soaps with oils and fats, and powerfully decomposes many salts, as those of ammonia, and of the earths and metals. It corrodes both animal and vegetable textures; rapidly absorbs carbonic acid from the air; and must, therefore, be kept in well-stoppered *green* glass bottles, because it acts upon those made of flint glass. Its usual sp. gr. is 1·063. It cannot be filtered, as it destroys all

organic matter. This solution will be found useful if kept in the laboratory, as a few drops in a pint of fresh water act as a solvent of oily or greasy matters.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

A few more words on glass baths and dishes will suffice. In regard to the latter, when built-up and joined with cement, we must call attention to a certain caution which is especially necessary:—it is important to keep each dish always for the same solution. In all cases, however carefully the joint may be made, there will be a slight rough line of cement at the joint, to which traces, minute it may be, but still dangerous traces, of the solution last used will cling. It will be obvious, therefore, that the dishes used for toning baths or hyposulphite of soda are unfit for silver solutions. We have recommended the principle of marking vessels and always keeping them for one purpose in any case, but in using glass vessels joined with cement, it becomes imperative to success and comfort in operating.

Where water-tight baths are required, it is customary to make the cover of a stout flat piece of wood the size of the top of the bath, lined with vulcanised india rubber, to give it elasticity and make it fit the opening of the bath perfectly. This is made fast to the top of the bath by means of brass clamps, which catch under a shoulder on the bath and are tightened by means of screws. This ledge or shoulder should run round the top of the wooden or gutta percha casing; and to make the perfect closing more certain, it is better that the glass lining should project about the thickness of a piece of card above the outer casing. We have said it is common to line the top with vulcanised india rubber; it is important, however, if this be used, that it should be again lined with a very thin sheet of gutta percha, or unvulcanised india rubber, so as to prevent contact between the silver solution and the sulphur used in vulcanising.

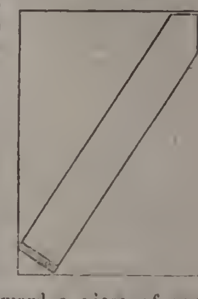
Glass Dippers.—A variety of forms of glass dippers have been proposed. The simplest, and one which answers the purpose exceedingly well, is that formed by taking a stout strip of plate glass of the desired length, about an inch-and-a-half broad, and cementing, by means of marine glue, a small strip of stout glass, a quarter of an inch or a little more in breadth, on the bottom end. There is no difficulty of any kind in using marine glue here, each piece of glass being made sufficiently hot, in the flame of a spirit lamp, to melt the cement when rubbed on. We made a dipper of this kind some two or three years ago, and have had it in constant use for large plates during that time without any accident. Where shellac or other cement has been used, we have frequently had the bottom ledge come off, leaving a plate in the bath, and we have had the annoyance of trying to fish it up, or having to empty the bath.

An improvement on this form of dipper was some time ago proposed by a correspondent, with a view to prevent the falling off of plates. He describes it thus:—"The strip of glass, forming the bottom of the holder, is cemented in the usual manner with marine glue; but before attaching it, I grind off the *inner top edge*, or the side which is attached to the holder, on the flat side of a common grindstone; and having done this, I place the ground edge on the convex side of the stone, and hollow out the top to within $\frac{3}{16}$ths of an inch of the whole length on each side. The glass plate, however unevenly cut, will thus rest upon the face of the dipper, on two *projecting points* at the bottom, and obviously acquire additional security." Diagrams more fully elucidating the form of this dipper will be found at page 106 of our second volume.

Another very simple form of glass dipper sometimes used, is made from a strip of glass sufficiently long, one end of which is heated in the flame of gas, or we have effected it by putting one end for a few minutes in a clear hot fire, and when soft enough to bend, turning a small portion up with a pair of pliers. Care should be taken that the pliers are a little heated, as if quite cold the hot glass is apt to fly on coming in contact with them. In our own practice we have found a very considerable drawback to the use of these bent-up dippers in the fact that they always hold in the bend a small quantity of silver solution, which often causes a stain along the end of the coated plate resting there before it enters the silver bath.

Another form of glass dipper has been proposed, but we have not tried it; its alleged object appearing to us a positive disadvantage. Instead of a strip of plate glass, a glass rod, bent to something like an elongated V shape, is recommended. Across the wide end a strip of glass is to be cemented. The object is to prevent the adhesion of the plate to the dipper by means of capillary attraction. This adhesion we have always regarded as an advantage, in preventing the plate from falling off when not accurately balanced; the difficulty of removing the plate is easily overcome by a little skilful manipulation.

For travelling baths the top of the glass dipper should be cut off at an angle like the figure in the margin. This, when placed in the bath for travelling, lies across the corners, without projecting above the top, as it would do in the vertical position. The position is here shown.



Ordinary care with glass dippers will, we believe, prevent any danger of knocking out the bottom of the bath with them; but as an additional safeguard, a piece of pure gutta percha or india rubber may be cemented to the bottom, which will have the effect of breaking any accidental sudden concussion. Where any doubt is entertained of the purity of the gutta percha so used, it should be, as we have more than once already directed, varnished with a thick solution of shellac.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 19*th February*, 1860.

One of our numerous scientific periodicals publishes the following lines upon the photographic art:—

"Photography has been scarcely twenty years in existence, and already its rapid progress and its astounding results have assigned to it one of the foremost ranks among the finest and most brilliant applications of chemistry. Each day, we may almost say, gives birth to a new process—an unexpected discovery—which, widening the field of study and photographic application, augments the importance of the art, whose adepts are already counted by thousands. Notwithstanding this, the photographic field is far from being entirely cultivated; subjects of research abound and multiply in it perhaps more than anywhere else. To work out a complete theory, which may explain the chemical processes it calls into action, to perfect the optical instruments it employs, to create light and easily-transportable apparatus, to discover certain and rapid processes, and to guarantee a long durability and stability to photographic images, such are some of the interesting problems, to solve which a numerous phalanx of investigators strive each day."

M. Quinet, one of the members of the French Photographic Society, has imagined and described a new kind of mounting and diaphragm for objectives. By employing a movable diaphragm of his invention, the same objective may be made to serve either as a combined objective for landscapes, as a combined objective for portraits, or as a simple objective with a long focus. This movable diaphragm, which has been constructed by MM. Digney frères, is, however, not altogether new, as it has often been used in various optical apparatus, among others, in Dubosq's electric lantern, but it has never before been applied to photography. It consists essentially of two plates of copper or brass, which are superposed one above the other; each plate has a large slit of a rect-

angular shape, and, on moving the plate by means of a screw, the square opening made by the combination of the two slits becomes larger or smaller at the will of the operator. This opening forms the diaphragm in question. It possesses, also, a graduated slip, corresponding to the motion of the screw, and which gives the measure of the opening. This diaphragm can also be carried away from the centre of the objective, either to the right or to the left, upwards or downwards. By this movement the intensity of the light which falls upon the sensitised plate can be modified at will, and, according to M. Quinet, certain effects produced that it would be impossible to obtain otherwise: he gives, for example, the re-production of clouds.

The French papers have spoken lately very frequently of the solar camera of Mr. Woodward, which, as your readers know, is destined to produce very large proofs. M. Bayard thinks that, to employ this solar camera to the greatest advantage, it should not be used to obtain large positives magnified from small negatives, but to magnify and produce large copies of the small negatives themselves, from which positives of great dimensions could be obtained in the ordinary manner. In this manner it is probable that a great waste of time would be avoided, and better results insured. M. Bayard, together with M. le Vicomte Aguado, intends to make some experiments on this head.

It is with pleasure I announce the appearance of the *Annuaire du Cosmos* for 1860, edited by the writers of the *Cosmos* of Paris, which made its first appearance last year (1859). The present volume is, perhaps, superior to the last; besides the useful tables of weights, measures, monies, &c., employed by the different nations, it contains a number of valuable scientific dissertations on astronomy, mechanics, photography, &c. The optical tables, tables of specific gravities, of temperature, of specific heats, of mechanical force, and statistics, are very numerous and complete. The latter part of the volume forms a little treatise on photography, with the latest processes of manipulation. I should mention also a map (contributed by M. Faye to this *Annuaire*) of those parts of Spain and Algeria over which the eclipse of the 18th July next will be total, to which is joined a small map, representing the appearance of the heavens during the eclipse, showing the positions of the principal stars and planets. As I have already stated in my letters, the four principal planets—Jupiter, Venus, Mars, and Mercury—will form a sort of parallelogram underneath and to the west of the sun. Still further to the left we have the bright star Regulus; to the right, the star Procyon; and just above the sun the two stars Castor and Pollux. The interesting papers on this eclipse published by M. Faye have been condensed in the volume before us, together with a paper, called "Hygiene and Hygienic Advice for the Different Months of the Year," by Dr. Foissac. The other articles are taken from papers of M. l'Abbé Moigno and M. Seguin ainé.

M. Blondlot, of Nancy, has called attention to a very curious toxicological fact, namely, that greasy matters have the power of diminishing considerably the solubility of arsenious acid, either in pure water or in acid and alkaline liquors. Thus, in contact with grease, the poisonous properties of arsenious acid are very much decreased, and, at the same time, it becomes more difficult to render its presence evident by chemical reactions. A very slight quantity of greasy matter, according to the author's experiments, reduces the solubility of arsenious acid to $\frac{1}{15}$ or $\frac{1}{20}$ of what it is when in a pure state. This explains why arsenic, taken in form of powder, remains sometimes for a considerable interval in the body without producing injury; it explains also how it is, that in cases of poisoning by arsenic, this substance has not been readily detected in such portions of the body or the aliments which contain much grease. It seems to teach us also that cream, for instance, is an excellent antidote for arsenious acid. Morgagni tells us, in some of his writings, that, in his time, the Italian boatmen used to astonish the bystanders by swallowing, without hurt, large pinches of arsenious acid, having taken the precaution beforehand of drinking a quantity of milk or eating some greasy matter. As soon as the public had retired they got rid of the poison by vomiting.

It has always been thought that the rain water which falls upon the leaves and stems of vegetables is gradually absorbed, and nourishes the plant. It appears, however, that this opinion is merely instinctive, and when tested by careful experiment, it proves unfounded, as is shown by a small paper lately published by M. Duchartre. For four years this author has endeavoured to discover, by direct experiment, whether or no such an absorption takes place. The plants submitted to these experiments were in pots, their stems and leaves being exposed to the rain, whilst the roots were prevented from absorbing any moisture, being hermetically closed up in the pot. All the plants submitted to this kind of investigation gave similar results: after remaining exposed to the rain, sometimes for eighteen consecutive hours, they showed no increase of weight; indeed, in some cases, they appeared to have experienced a slight diminution.

The *Monitor de la Salud* publishes the following method of restoring damaged velvet to its original condition. It is well-known that when velvet has been wet, not only its appearance is spoiled, but it becomes hard and knotty. To restore its original softness, it must be thoroughly damped on the wrong side, and then held over a very hot iron, care being taken not to let it touch the latter. In a short time the velvet becomes, as it were, new again. The theory of this is very simple. The heat of the iron evaporates the water through the tissue, and forces the vapour out at the upper side; this vapour passing between the different fibres, separates those which adhered together in hard bunches. If the velvet were ironed after damping, an exactly opposite result would be obtained; it is, therefore, necessary that the substance should not come in contact with the heated iron.

THROUGH JAPAN WITH A CAMERA.*

(*From our own Correspondent.*)

WE found the way which led from the ruins, in the direction in which we were going, much more easy to travel than that by which we had come; and, doubtless, at the time they were frequented by the inhabitants of the country, it was from the direction of the coast they had come. The descents were sometimes very steep, but these were short, and arose from local accidents in the upheaving of the mountain—the sides sloping much more gradually towards the sea than inland. The journey from these ruins to the coast was a long one, but we saw nothing of any particular interest on our way, except a volcano in active life. Such volcanoes are by no means rare among the mountains of Japan, and, but for them, I am disposed to think the destruction of life and property by earthquakes would be much larger than it is; they serve as a vent for the fearful energies which are generated in the interior of the earth. The volcano which I have just mentioned was situated near the foot of the chain of mountains we had crossed; and as it did not appear difficult to ascend to the crater, Dsetjuma and I rode up the side as far as we could go, and then dismounted, and finished the remainder of the distance on foot; but we might as well have contented ourselves with looking at it from a distance, as far as the interior of the crater was concerned, for the fierceness with which the flame rushed upwards, and the intense heat it threw out, prevented us from approaching it within several yards. We remained looking at it for about half-an-hour; but, during that time, we could perceive no intermittence in the intensity of the flame; it continued to pour forth with a steady, sustained roar, like a number of blast furnaces.

Not far from this volcano we came upon the hot springs, which doubtless owe their origin to the volcanic nature of the district. There were several houses built about them

* Concluded from vol. iii. p. 289.

for the accommodation of people who use the wells for the cure of rheumatic and other complaints. There were four of these springs altogether, and they differed in the degree of heat which they presented—one being so hot that it was impossible to bear it for more than an instant at a time.

. . . .

The village was situated in the bend of a beautiful bay, the entrance to which was narrow, and the channel navigable by vessels still narrower. The people cultivated rice on a few patches of ground, aud were supposed to eke out an existence by fishing, but I saw in the cottages I entered objects which induced me to think they did not entirely rely for support on what they obtained in this way. I saw several articles which I know were not manufactured in Japan; among others, an ivory crucifix; a large, richly-gilt image of a saint; a seaman's locker, on which a Russian's name was painted, and having a tawdry picture of some saint pasted on the inside of the lid, beside many other things, even more out of place in a Japanese cottage.

The fatigues we had undergone on our journey had affected Dsetjuma's health, so that we decided on remaining here until he had recovered, especially as we thought that his recovery would be promoted by sea-bathing; and it was during our stay here that a tragical event happened, which brought my journey through the interior to an abrupt termination. I have already mentioned the suddenness with which storms arise in this country, and it was one of these sudden storms which led to the occurrence I am about to describe. . . . . .

As the storm increased, the sea rolled into the bay with great fury, though it was some time before the waves begau to break on the shore in front of the cottages, but, when they did, the spray flew right over them. We sat up late that night, in consequence of the storm increasing rather than diminishing in violence, but at last we got too tired to remain up any longer, and stretched ourselves on the mats and went to sleep. How long I had been asleep I don't know, but, when I awoke, the storm was still raging, notwithstanding which, I fancied I could hear shouts, and as I never undressed while travelling, it was no trouble to get up and go out, to see if anything was the matter. The day had dawned, though it was still dull and lowering, and the rain had ceased, but the sea was even higher than when I saw it on the previous night. These were the first things which struck my attention, but, almost at the same instant, I caught sight of a vessel in the bay, of, I should think, about 400 or 500 tons, which was driving rapidly along in the direction of the shore. She had two sails still in their place, but the others were streaming in the wind, which had blown them to tatters. I could distinguish six or seven men who were clinging to different objects on the deck, but the force of the wind was such that it must have required all their strength to prevent themselves from being blown off their feet. The point at which the vessel would come aground was so evident, that I moved at once in that direction, but before I could join the fishermen who had assembled on the shore, the ship had struck, and such was the force with which she took the ground, that she ran her hull almost out of water, then turned over on her side, and her crew were struggling in the foaming waves. Some of them were drowned close to the vessel, but not all, and I counted four swimming towards the group of Japanese fishermen, whom they, doubtless, supposed to be assembled there for the purpose of assisting them. Poor fellows! my blood runs cold even now, when I think of the fate they encountered. The Japanese were provided with long poles, and grapnels attached to ropes; and I supposed they had them for the purpose of rescuing the drowning wretches, but no words can express my horror when I saw one of the brutal ruffians thrust a sailor, who had almost reached the shore, beneath the water, with his pole, and keep him there until he was drowned! I remonstrated with them, as well as I was able, but the very excitement under which I was labouring prevented me from making myself understood as well as I otherwise might have done; and I do uot imagine they would have been influenced by what I said, even if they had comprehended all I wished to say. Another approached the shore, and was treated in a similar manner; and a third poor fellow, who saw his comrade's fate and turned aside and swam in another direction, in the hope of escape, was at last forced ashore by the strength of the waves, and was thrust back into the sea and drowned. Finding it was useless for me to attempt to save the unfortunate sailors, I ran to fetch Dsetjuma, thinking that his authority might force them to cease from their murders, but when he arrived it was too late; there was a heap of corpses, already stripped of whatever clothing they might have had on wheu they were washed ashore. He reproached them for their cruelty, and threatened to have them punished. They threw themselves on their knees, and were humble in their entreaties that he would pardon them; but the savage looks which they gave me showed how gladly they would have treated me as they had treated the unfortunate sailors, if they had dared; one of them even ventured to approach me with a threat, but the reception he met with was not such as to encourage him to repeat it.

I now saw the use of the grapuel. Whenever any article floated within reach of the rope to which the grapnel was attached, it was cast, and the article hauled ashore, through the surf. All that night and the next day, the sea coutiuued to roll in heavily; and it was in the afternoon of this day that it came to our knowledge that the wreckers had decided on poisoning us, if possible, and, if not, to murder us after we had left the village. Seeing that Dsetjuma's servants could save us from the former fate by preparing our food for us, the only thing we had to fear was, that they might fall upon us when we were on our journey, and we anxiously discussed the best course of proceeding. Fortunately, we were relieved from a choice of evils by the arrival of a Japanese vessel iu the bay, the captain of which had been induced to enter by seeing the wreck. With him we entered into an arrangement to take us to Nangasaki, to which port he was bound, and where we arrived in safety, after a rather dangerous voyage along the coast. Thus ended my trip through the interior of Japan, of which I have endeavoured to give an imperfect account in this journal, and which, with the addition of more solid information, will probably form the subject of a book at no very distant period.

[In terminating these extracts from the journal of a photographer in Japan, we may mentiou that those of our readers who reside in London or its vicinity will probably have an opportunity of inspecting some of the prints taken by our correspondent, as appears from the following letter, which we have received from the gentleman through whom the journal was forwarded to us:—

"*Rue du Marché aux Poulets,*
"*Bruxelles.*

"Esteemed Sir,—

"I thank you for the journal and the ———.

"I have received there is but a few days since a parcel of photographs from Japan which it will be to me a pleasure to show you when I come to England, after I shall have been to Amsterdam and Rotterdam.

"Accept the assurance of my distinguished consideration.

"Your obedient servant,

"F. Van Hoogen."]

New Photographic Apparatus.

ACHROMATIC MIRROR STEREOSCOPE.

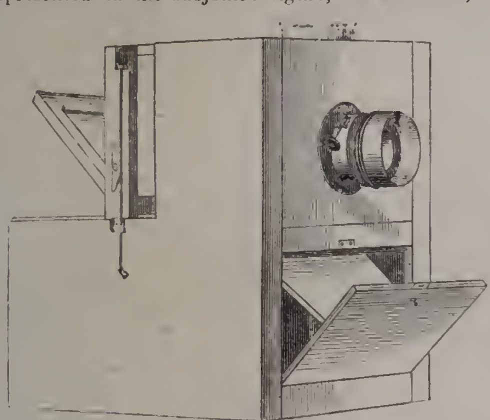
Messrs. Smith, Beck, and Beck have lately patented an achromatic mirror stereoscope, expressly for the exhibition of paper stereographs, either as mounted in the usual manner, or as book illustratious. The principal feature of this stereoscope is the application of a mirror nuderneath the lenses, so that when the instrument is held facing the light,

the picture receives a large amount of reflected rays in addition to the direct rays. This double illumination not only imparts an increased brilliancy to the stereographs, but, from the circumstance of the light falling in opposite directions, the irregularities upon the surface of the paper cast no shadows, and a source of annoyance is completely removed.

This stereoscope is fitted with achromatic lenses, affording the best possible definition, and correcting the colour produced on the margins of objects by single lenses. A ground glass partition separates the pictures without, under any circumstances, throwing a shadow. The adjustment for different kinds of vision is very simple and complete, and the instrument will, we think, be found to answer the object for which it is contrived.

NEW LABORATORY CAMERA.

M. Titus Albites exhibited to the French Photographic Society an apparatus called by him a photographic developing laboratory. The object of this apparatus is to allow those inexperienced in the photographic art to execute, in full daylight, without travelling tent or dark room, easily and mechanically so to speak, operations with collodion. It is made, as represented in the subjoined figure, of a camera, whose



sides are extended so as to form a box of double the dimensions of those of ordinary cameras. The upper half constitutes the ordinary working parts of a camera; the lower portion forms the laboratory. The back of the chamber, which acts as a frame, contains, in its lower portion, a gutta-percha dish, concealed in the laboratory, which also contains the silver bath. This dish, as may easily be supposed, moves with the frame, and partakes of its sliding movement. A cord, which may be seen at the side of the camera, is held in its place by a counterpoise; it supports in the frame a small plate of silver, intended to hold in its place the collodionised glass. In front and underneath the object-glass, a door opens through which the hand may be introduced into the interior of the laboratory, and the implements handled which may be there required for use. The following is the mode of using this apparatus:—The door below the object-glass being closed, the shutter of the frame is also closed, and the ground glass is placed in the frame in the ordinary way. This being removed, it is replaced by the collodionised glass, which is held in its place by the small piece of silver fixed in the upper part of the frame; then detaching the string affixed to the exterior partition, which holds this piece of silver, the glass is by its own weight allowed to fall into the silver bath, placed directly underneath as already explained, raising it and again immersing it, till it be completely washed. From twenty to twenty-five immersions are necessary and sufficient to obtain this result. The glass thus sensitised, the object glass is uncovered, and the exposure is continued for the requisite time. The object glass then being covered, and the plate covered with a piece of india-rubber cloth, and the silver hook being detached, the plate is held by the extremities and then passed into a developing bath, placed at a certain inclination in the interior of the laboratory, the sides of which are formed of yellow glass, and which, receiving the plate in a groove, prevents its touching the sides. The door beneath the object glass is then opened, and the veil which is attached thereto is lowered over the developing dish, so that the light cannot injure the impression. The yellow glass dish is then removed from the laboratory, and as it admits of the process of development being continued in diffused light, the operator must watch its progress through the coloured glass. Among the principal advantages which M. Titus Albités attributes to his apparatus, he especially mentions the suppression of numerous frames which in a great measure removes the causes of spots. He further insists, that it is always easy for an operator to restore to the sensitised glass the humidity necessary for it to become rapidly impressed, and which disappears when a certain time elapses between the sensitisation and the taking the impression.

Proceedings of Societies.

Architectural Photographic Association.

The lecture announced to be delivered on Tuesday last, by E. I'Anson, Esq., "On French Architecture of the Renaissance Period," was unavoidably postponed; Mr. I'Anson being unable to attend, in consequence of domestic affliction. The Secretary having received notice of this unhappy circumstance only twenty-four hours previous to the time of the lecture, had no opportunity of making other arrangements.

We are requested to state that the arrangements for next Tuesday, when a lecture is announced by Mr. Fergusson, on "Photographs of Jerusalem," will not be interfered with. A letter has been received by the secretary from Mr. Tite, M.P., who was announced to take the chair on the last occasion, expressing the hope that he will be able to attend next Tuesday.

In our next impression, we purpose to commence our notices of the interesting collection of photographs exhibited by the Association.

Blackheath Photographic Society.

The twenty-second ordinary meeting of this society was held at the Golf Club House, Blackheath Hill, on Monday; the president, J. Glaisher, Esq., F.R.S., in the chair. The usual business having been brought forward and concluded,

Mr. H. T. Wood exhibited a very portable and compact developing-box, which served to get rid of the intense heat and other inconveniences of a tent. The fittings were exhibited and explained; and Mr. Wood declared it to be, in his opinion, the most useful he had yet met with.

The President described at some length the method by which the variations of wet and dry bulb thermometers are registered at the Royal Observatory. The papers (which he exhibited) being cylindrical, and the action of light cut off, or impinging through the variations of the column of mercury itself, the cylinder of sensitive paper is rotated by a chronometer, and the general arrangement does not differ materially from that employed in registering the diurnal magnetic variations.

The usual vote of thanks to the Chairman terminated the proceedings.

Miscellaneous.

Our Copper Coins.—Just now, when the substitution of lighter and more convenient coins for our heavy copper money is under consideration, it will not be uninteresting to those who desire to see our money reduced to a reasonable bulk, to point out the suitability of an alloy of nickel and copper for the purpose. We do not claim the idea as our own, because an alloy of this kind is already in use in America; and, judging from a sheet of photographs of various coins in circulation in that country, which we have been shown, that mode of a combination of nickel and copper is by no means the worst. The head and inscription, and even the word "liberty" on the band which encircles the head, is sharp and distinct. The proportion in which the nickel enters into this coinage is from 15 to 18 per cent., and the diameter of the cent (equivalent to our halfpenny) is slightly less than that of our sixpence. For many years past, coins made of an alloy of silver, copper, zinc, and nickel have

been in circulation in Switzerland. In Belgium, it is proposed to issue coins, of a small value, formed of three parts copper to one of nickel, an alloy which has a considerable resemblance to silver. The latter metal may be very closely imitated by an alloy of 50 parts of copper, 25 of nickel, and 25 of pure silver.

Photographs of the Pope.—To increase the effect of the pamphlets, preaching, and prayers, emanating from the energetic Bishops of Orleans and Poictiers, on behalf of the Pope, a large number of photographs of the Pontiff are being circulated throughout France. They represent him under three different aspects; in one of which he is seated in a chair in front of the ornamented crucifix, familiar to those who have had the honour of kissing the holy toe, wearing the white surplice, and all the paraphernalia with which he is decorated on reception days, &c. As to the expression of his countenance, a distinguished member of the Church writes of the portrait—"His widely-opened eyes seem to bury themselves in the depths of eternity, but the smile on his lips and the expansion of his mild visage express a sentiment of supernatural calm, which is very striking."

Photographic Notes and Queries.

THE SOLAR CAMERA.

Sir,—In this day's "News" there appears an article on the solar camera. I feel, if what is said of this camera be true, it is just the thing for which I have been looking and wishing, but I cannot learn if any individual who has one uses it for landscapes. Can any one tell me if it can be used so that it is not necessary to give the picture over into the hands of the artist to finish? Can a fine photograph be obtained by it? I mean *a landscape;* or is it possible to get from a stereo. landscape negative one increasing say ten times in size? or is this to be done by any means? I feel, if it could at once, we may do away with large and cumbrous apparatus; indeed, I have some exquisite little stereo. negatives, if they could be enlarged, I should be delighted. J. L. F.

February 11, 1860.

SILVER RESIDUES—CARD MOUNTS.

Sir,—Will you have the goodness to allow me, through your journal, to invite an advertisement in the "News" from some respectable house willing to take the *silver* recovered from old solutions, and also from some one who will supply card mounts for photographic pictures of different convenient sizes, say 12 × 10, 15 × 13, and 18 × 16, or thereabouts? This is an article much required by amateurs, and at present very difficult to obtain. No doubt a *tinted pasteboard* could be made, or *stamped borders* impressed on different-sized *cards*, to suit prints from the various sized plates. Something with a nice bright face on one side would, I am sure, sell well, and amply repay the manufacturer for his trouble in preparing it. J. W.

IS IT LAWFUL TO DESTROY THE CURRENT COIN OF THE REALM?

Sir,—We often read formulæ for making chloride of gold commencing thus:—"Take a half-sovereign," &c., &c. Will any gentleman of the legal profession who reads the "News" tell us whether a person disposing of his money in this way renders himself liable to the penalties of the laws against defacing or damaging the current coin of the realm? D.

[A person would only be liable to the penalty if he attempted to pass the coin of the realm after defacing it or diminishing its value.]

EXCHANGE OF LARGE PHOTOGRAPHS.

Sir,—I am much surprised that no one has taken up the subject of your correspondent's letter—"A Member of the Stereo. Exchange Club." With reference to the exchange of large photographs, you will recollect, in accordance with your wish some months since, I forwarded a specimen 15 × 12, which you approved, and here the matter rested. If you have only half-a-dozen names, it would be sufficient to test the practicability of the scheme. H. Higgins.

PHOTOGRAPHY AND THE MAGIC LANTERN.

Sir,—Would you or some one of your numerous correspondents do me and many others the favour of stating particulars as to photographing slides for the magic lantern, giving formulas, &c.?

In your first volume there are several articles on slides, but none giving the above particulars. J. N. S.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Friday,	Feb. 24	—Photographic Society of Ireland.
Tuesday,	" 28	—Birmingham Photographic Society.
		Architectural Photographic Association,—Lecture at Seven o'clock.
Wednesday,	Feb. 29	—North London Photographic Society.
		Nottingham Photographic Society.
Thursday,	Mar. 1	—Belfast Photographic Society.
Friday,	" 2	—Norwich Photographic Society.
Tuesday,	" 6	—London Photographic Society.
Wednesday,	" 7	—Manchester Photographic Society.
Tuesday,	" 13	—Photographic Society of Scotland.
Wednesday,	" 14	—Chorlton Photographic Society.
Monday,	" 19	—Blackheath Photographic Society.

TO CORRESPONDENTS.

*** *The object of the Proprietors of the* "Photographic News" *is to render it of value, not only as a record of the progress of Photographic Science, but also as a medium of inter-communication between Photographers at home and abroad. The best attention will therefore be given to communications from the readers of this Journal respecting matters of interest which may come under their own observation.*

Original Earnest.—1. You had better iodise the plates yourself, if you are experienced in the operation. 2. The addition of a bromide is not necessary for the particular object you have in view, although it is generally useful. 3. It is successful in the hands of those who have employed it. 4. They can be so intensified. It appears to us, that you are trying to run before you can walk.

F. E. G.—The defect you notice may arise from several causes, which can only be determined by careful experiment. The portrait lacks solidity: more contrast of light and shade: the background is too light—it is of the same tone as the face, which is lost in it: let one side of the figure be illuminated by direct light, the other by reflected light. We shall always be ready to give you our opinion on your productions.

R. M. R.—Arrange matters so as to get direct light on one side, and reflected light on the other; avoid cross lights from different windows; let the roof be as high as possible, and "lean-to;" the colour of the wall somewhat of a leaden hue, with movable backgrounds of different tints of grey, which must be adapted to the colour of the sitter's drapery. The journal you inquire about is in course of publication.

T. Collins.—1. Your object will be obtained by using an iron-developing solution, strengthening with pyrogallic acid. 2. The paper can be sent by post. 3. We have employed paper like that you have sent a sample of, and found it answer very well.

X. X. is thanked for his communication, on some points of which we entirely agree with him, and his suggestions shall receive our best attention. On other points, we are diametrically opposed to his views, and our opinion in these respects is borne out by experience.

An Invalid.—You have got a very complex and cumbrous affair, and had better fit the lens to a simpler camera. The nitrate of silver was adulterated; the acetic acid also. The size of the glass house may vary according to convenience, say five feet by twelve, and as high as practicable.

J. V.—On page 59 of the "Photographic News Almanack" is a "Table showing the distance at which the focusing screen must be placed from the centre of the lens in taking enlarged and other pictures." Your question will be answered by reference to it.

J. Thompson.—The spots are caused by impurities in the solution, and want of care and cleanliness. Chemical purity must be preserved, or you will have nothing but failures.

H. F.—The red spots appear as if caused by bubbles on the surface while toning. The blue colour is caused by the prints remaining too long in the toning-bath.

W. H. Hawkes.—1. The back lens turned outwards to remain. The length of the camera must be greater than that of the focus of the lens.

Black (Falmouth).—You want a little more reflected light on the drapery. Spread a light cloth on the floor around the sitter.

Argent Nitratis.—Exposed too long in the sun. Over printed; the toning appears good enough.

A Tyro.—1. You had better have nothing to do with positive printing by development. Your query as to the enamel process is unintelligible.

S. L.—Of Mr. J. Bullock, 79, King William-street, E.C.

Magna Charta will be answered in our next.

J. E.—See "Photographic News Almanack," p. 59.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard.

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 78.—March 2, 1860.

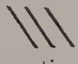
ON COMPOSITION AND CHIAR-OSCURO.—III.

BY MR. LAKE PRICE.

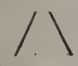
"Ars est celare Artem."

Composition is the selecting and arranging the objects which are represented in a picture in such manner that they may contribute efficiently to the elucidation of the subject depicted, and also that an agreeable impression may be conveyed to the spectator by the harmonious balance of its parts. Correct composition is equally necessary for all pictorial representations, whatever may be their nature. In referring to most of the works of the ablest artists, which have descended to us, we shall find that they have, whether *intuitively* by the feeling which has come from long practice, or from adherence to fixed rules, furnished examples of certain principles which cannot be departed from, even in works of the lowest order in art, without immediately producing a disagreeable impression. But we must not suppose *all* artists, whether ancient or modern, acquainted with the principles of correct linear composition; such is far from being the case; but often, by the subsequent skilful arrangement of the light and shade of a picture, forms which, had they been emphasised, would have been disagreeable, are melted away into the depths of backgrounds, blended into a breadth of light, or treated in such a manner as to be balanced not by *linear form*, but by *direction of shadow;* which, therefore, in such case, fulfilling the duty of lines, completes the correctness of the otherwise faulty design almost as much as actual forms would have done. On the other hand, numerous works exist in which there is considerable correctness of lineal composition; but, wanting the impress of genius and *mind*, they remain cold and academic, and have little interest for the beholder.

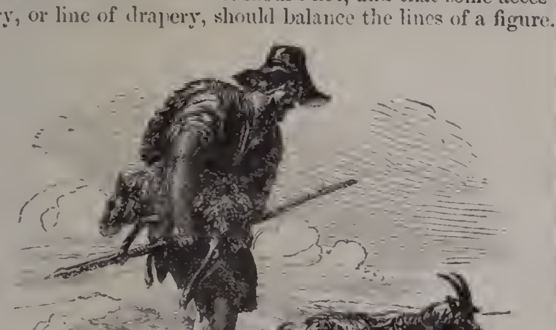
All lines in a picture should be balanced, or compensated; thus it would produce a most disagreeable effect, that several objects should successively take a similar direction:



In some part of the picture there must be the compensating lines:



not that it follows that it should be a similar object—indeed, sometimes it is better that it should not, and that some accessory, or line of drapery, should balance the lines of a figure.



In the illustration, *the stick* is not only the main compensating line, but, by the contrast of its *straight* form, gives movement to the figure and value to its curved lines. It is not always necessary that the compensating lines should be in *immediate* juxtaposition, provided they exist in the picture, nor need they be *equal* in quantity; one may be much less in size, but being more strongly accentuated by the subsequent light and shade, will thus antagonise a larger form.

No series of objects should be placed one immediately beneath the other in a picture. The result would be that the more distant ones would appear to be upheld by the nearer, all illusion and effect of distance destroyed, and absurd combinations occur, as of a figure standing with his feet in a (foreground) basket, with the spire of a (distant) church for his head gear. Neither is it desirable that a series of objects should follow each other in a horizontal line across the picture. It is generally better that the leading action or personage, or point of greatest interest, should be placed near the centre of the picture, and not at the sides.

It is also proper that the attention and interest of the actors in the scene portrayed should be concentrated within it; wherefore, with few exceptions, the figures on either side generally face towards the principal action, and by this means seem to participate in it, and heighten its reality and interest. This *always* in pictures depicting violent emotions, since the withdrawal of one head to look at the spectator, would argue indifference to the action of the subject. In other compositions, one, or two heads at most, looking out of the picture, gives variety, and has a good effect. (See boy's head in Titian's "Ex Voto," in the Frari at Venice; Boors in "Los Borrachos," by Velasquez, at Madrid, &c.)

Sometimes, though rarely, however, to the better delineation of the action of the picture, figures are represented leaving it, as the figure rushing in affright from the flames in Raffaelle's "Incendio del Borgo," balanced, however, by the figure on the other side of the composition; and the admirable figure of the steward in Hogarth's "Marriage à la Mode," who is quitting his master's presence in despair.

Contrasts are desirable, to *a certain extent*, according to the nature of the subject, in the *positions of the heads* in a composition. Thus, some will be full face, some back, some three-quarters, some profile, and some under or over foreshortened; and of many of the heads and faces, and figures, *portions* only should be perceived, the rest being hidden by those in front of them. And in all pictures by the great masters, even the heads in a group *compose* with each other: thus, if one head is foreshortened three-quarters under, the compensating upturned head is generally seen.

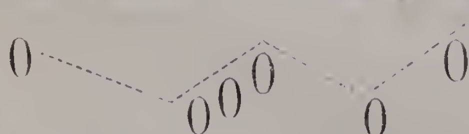
Contrast in *the character of the heads*, and when the subject permits, is of vital importance. Thus, infancy and age, beauty and its opposite, are as necessary and legitimate foils to each other as light and shade, hot and cool colours, &c.

In Wilkie's "Blind Fiddler" we have a fine example of the composition of a group, the construction of which is regular in the balance of all its lines, yet, withal, as completely natural as it is possible to conceive the lines of the two seated figures oppose each other; every line in the group *a* will be found to have its compensator, and the upright of the central standing figure serves as a pivot to them all, and gives movement and animation by contrast. The hollow in the centre of the group receives a deep shadow, in which forms are hardly distinguished, giving repose; whilst upon it the light apron of the mother and heads of the children come out with sparkling vigour, thus making,

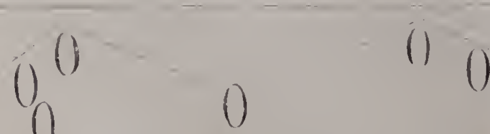
by opposition, the shadow more intense—the light more brilliant. The upper line of the head in the composition *b* is opposed by the lower; and in every respect, except, perhaps, the foreground still-life being a little too forward, and immediately under the leg of the fiddler, the grouping is perfect.

a *b*

Judicious *foreshortening* of one or more figures in a composition is of immense advantage to the picture, since it gives *depth and reality* to the subject, and takes the mind of the spectator from the flat surface of the canvas into the picture; witness the masterly treatment of the figure of Ananias in Raffaelle's cartoon. In the infancy of art great simplicity obtains in the practice of the masters in whose groups foreshortenings are unknown, which in them is not without its charm, but would appear want of knowledge in a modern painter. To draw the precise line of demarcation marks the man of talent; avoiding, on the one hand, too dry and Gothic a treatment, and, on the other, bombastic atti-

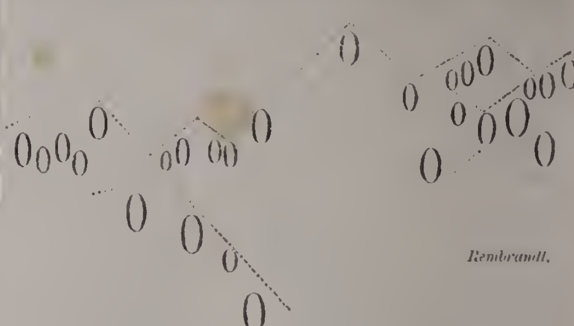


Correggio.



Titian.

tudinising. Of the extreme of pictorial power in violent contortions and expressions of every conceivable kind, is Rubens' "Fall of the Damned," now in the Pinacothek, at Munich, which is a marvellous example of what may be dared and done successfully by such a talent. The treatment of the subjects in Giotto's frescoes at Padua exemplify the earlier art. The character of the upper outline of a composition should receive the artist's best attention; it should not cross the picture in a horizontal *line*, but should be judiciously broken and varied; nor should the quantities be equal, as, say, a head, a given space and another head, a similar space, another head 0 0 0, &c.,* and so on, but a natural irregularity should be shown. In masses of thirty or fifty, the persons to be represented must be broken up into irregular and varied groups—some sitting, some standing,



Rembrandt.

some facing, some turned away from the spectator, and the leading lines of such portions of the mass should antagonise each other; observe in the diagram *c* the downward combinations of masses, opposing the upward *d* and not following them, *e*.

c *d* *e*

The *very first* lines of a pictorial representation must be appropriate, and in themselves express somewhat of the feeling of the action of the picture, or they are erroneous,

* Such a *group* (!) is possible; one similar was exhibited and published by a leading photographer.

and, in proportion to their inappropriateness, weaken the power of the artist of subsequently realising his conceptions. Thus the tumultuous confusion of a battle-piece could not be painted on lines which would be the apt incipients of the representation of a dignified ceremonial. As an illustration, let us take the *lines* of Gericault's "Naufrage de la Meduse." Observe the *precise balance* of line in the prostrate dead and the two despairing figures immediately above, with the whirl of fevered excitement which the cry "a sail!" causes, even in the sinking and dying wretches. See how admirably the interest is carried up *linearly* by the climbing figures on either side, in the struggle to descry the far-off vessel, to its apex, the negro signalling. The *straight* line of the mast gives mobility to the excited action of the figures, and by its inclination balances the general direction of the group; the whole with as perfect verisimilitude and nature as we have seen in the placid interior by Wilkie, and with as little appearance of artifice in the composition.

In any subject of strong passions or emotions, the repetition of the same lines is allowable—nay, is often very useful; their very discord attracts the eye of the spectator, and emphasises the action. Observe how the three parallel outstretched arms in this picture give point to the interest, and add to the nature and pathos of the subject. But here a sound discretion must be exercised. The abuse of this feeling in composing a subject is strikingly exemplified in David's picture, "Le Serment des Horaces," who, with legs and arms in stagey position, face their sire.

(*To be continued.*)

ARCHITECTURAL PHOTOGRAPHIC ASSOCIATION.

THIRD ANNUAL EXHIBITION.

ALTHOUGH unlimited in the sphere of its operations, the photographic art displays its powers to the best advantage in their application to architectural subjects. In them the anomalies produced by the unequal action of colours are not so conspicuous, as colour does not enter largely into the composition of an architectural subject. The sober hues of the time-stained monuments of antiquity, the warm or cool greys of the material of which modern structures are composed, are well adapted to yield a good photograph, in which the chiar-oscuro is not interfered with by local colour. Then the marks of the "tooth of Time," and all the microscopic detail of texture, are given by the camera with an accuracy of delineation, that defies the utmost skill of the artist's pencil—all these advantages confer a great value on architectural photography, and, in this Exhibition of upwards of five hundred subjects, ample opportunity is given for comparison and study.

The pictures are grouped together by countries, of which North Italy, France, and our own country, severally enjoy the larger proportions. The most conspicuous are the productions of M. Bisson and M. Baldus. The first-named artist contributes views of some of the most important ecclesiastical structures in France, such as the Cathedrals of Rouen, Rheims, Amiens, Chartres, Orleans, Paris, Tours, and Strasbourg. Among these we may specially distinguish the "Portal of the Cathedral of Strasbourg," which is exceedingly clear, sharp, and vigorous. "The Clock Tower"

of the same is particularly good, and remarkably curious and interesting in subject. There are three views of the west front of the "Cathedral of Tours," truly remarkable for vigour, solidity, and detail. The rich sculptures of these fine Gothic structures were never fully known to us before, nor never would have been known, but for photography. Most of the drawings and engravings of these edifices are mere guess-work:—they have no pretensions to fidelity, as the slightest comparison with the photographs immediately proves. Their inaccessibility to the draughtsman is, of course, one reason of this deficiency in the works of the pencil and the burin; and another is, the mannerism of the artist. Fortunately, photography does not indulge in mannerism, although there may be a great difference in the manner in which the same subject is treated by different photographers.

It is to be remarked that many of the photographs by M. Bisson and others show that, although abundant light is essential to the production of a good architectural photograph, yet too much light is detrimental to the effect of solidity looked for in works of this class, as it gives an appearance of flatness.

The French artists are particularly fortunate in their subjects, embracing, as they do, many of the finest works of the Gothic and Renaissance periods. The "Staircase of Francis I.," at Blois, is an external structure, exceedingly picturesque from the intermingling of panels with rising shafts, and delicate but vigorous carving. The "Pavillon Carré," in the same city, is a bold subject, and exceedingly well represented. This series is rich in cathedral portals, and many of the photographs are representations, on a larger scale, of the sculptured details in the general views. Among these is the "Tympanum" of the south portal of the Cathedral of Rheims, representing the Last Judgment, exceedingly curious and interesting to the iconologist. It is well described by Didron in his *Iconographie Chrétienne.*

There is a view of the "Place de la Concorde" at Paris, which, although cold and heavy in the shadows, is very interesting from the miniature view of the city beyond, seen over the buildings in the foreground. The noble old "Tower of St. Jaques de la Boucherie" makes a fine picture. At the foot, in a little garden, we see invalids and nurse-maids with their charges, sitting in the sunshine.

Among the productions of M. Baldus, we may specially mention his view of the elaborately-decorated "Porch of St. Germain l'Auxerrois," and the church of "St. Vincent de Paul;" the views in the "Court of the Louvre," the "Staircase of the Palais de Justice" at Rouen, which appears to be a favourite subject with photographers. The colour affected by this artist in his productions is umber, not altogether the most pleasing, as it makes the buildings appear as if they were constructed of red sandstone; the tone adopted by M. Bisson is much more agreeable.

Rouen has been visited and photographed by English artists, Messrs. Cundall and Downes, who have taken views of the "Cathedral St. Ouen" at Rouen, of the "Palais de Justice," and other antiquities of the same city. They are remarkably clear and sharp—too much so, probably, to convey an accurate notion of the originals, but that is a matter of taste. The French views are taken, we believe, from negatives on waxed paper, which appears to impart a superior softness of outline; while the English artists employ collodion.

Some late additions to the French section of the Exhibition consist of enlarged views of many of the sculptures contained in the general views of the Portal of the Cathedral of Rheims. M. Bisson also contributes a few views in the Netherlands, Germany, and Switzerland, among which the "Court-yard of the Castle of Heidelberg," the "Hotels de Ville" of Louvain, Ypres, and Ghent, and the "Maison de Bateliers" at Ghent, are especially interesting.

(*To be continued.*)

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. S. BOURNE.

BUT there is another very important qualification which the photographer must possess, and which is of a kindred character to that just adverted to—viz., a *facility for observing and attending to the smallest particulars, united with a patience that can stop to do everything thoroughly.* I am fully convinced that it is the possession or non-possession of this qualification, which more than anything else constitutes the chief difference between a successful and an unsuccessful photographer. All the various manipulations involved in the production of a perfect photograph, are of such a delicate and peculiar character, that we may consider them in this respect almost unique, and unlike what is required for any other business or profession. Consequently, it not unfrequently happens, that persons who take up photography, apply to it the same *comparatively rough* handling which suffices when engaged in ordinary pursuits. But this sort of treatment will not answer for photography; hence the reason why so many fail, and that without knowing the reason why. The perfect result depends in so great a measure upon the *minute and careful manner* in which every operation is conducted, and success or failure hang so tremblingly on certain apparently trivial and unimportant particulars, that those who have not that calm temperament which such operations require, and whose business habits or impetuous manner prevent them from exercising the necessary amount of patience and caution, are almost certain completely to fail. For instance, a person of this description may think that the glass which is to receive the impression is sufficiently clean, if when he holds it up to the light he can see no stains upon it, whereas it is necessary that it should not only be visibly but chemically clean; or he may think that any ordinary clean cloth will do to wipe it, whereas it requires cloths washed free from every trace of soap, and kept specially for that purpose.

Again, it is not unusual with a photographer of this description, when about to coat a plate, as he lifts the collodion bottle from the shelf for this purpose, unthinkingly to disturb the sediment, or to forget to wipe off the dust, and dry particles of collodion which adhered to its mouth—the consequence of which is, some ugly spot, comet, or blot, or a number of them, which completely spoils the picture, however perfect in other particulars. The condition of the nitrate bath is a matter of the greatest importance, and yet one, perhaps, which is most neglected by those inattentive photographers. If it becomes alkaline even in the smallest degree, every picture is covered with a dense fog or mist; and if it were the portrait of a friend, it would not be very consoling to see him always in a fog. If there is too much acid in it, or if it is deficient in silver, the plates will be extremely insensitive; and our friend's portrait, in this case, will resemble that of a nigger, the general outline, shirt-front, nose, and forehead being all that are visible. A slight *pause*, when lowering the plate in the bath, will leave its effect after fixing in a well-defined straight line across the whole plate. The addition of too much silver to the developing solution will give us to perfection the pictorial effect of "soot and whitewash."

The existence of any one of these apparent trifles is sufficient to determine the character of every picture, and render all our efforts perfectly useless.

Hence, those who overlook or pay no attention to these and many similar particulars, need not be surprised at their want of success, or that their best productions are often deformed by some hideous stain, or other serious defect. I have heard of photographers who have employed one of the servants to prepare their albumen,—the grand agent in

* Continued from vol. iii. p. 298.

preserving their plates,—imagining, I suppose, that what would give effect to some fancy article of cookery, would be equally efficacious in cooking a picture; and *cook* it I have no doubt it would, though, I am afraid, not in a very satisfactory manner. It may be a very pardonable mistake, but a mistake it certainly is. The photographer who succeeds the best, or succeeds at all, is he who detests these slight, but radical, errors, and employs all his diligence and patience to avoid them; who conducts every operation himself, and permits not the slightest circumstance to escape him; and whose whole energy and activity are directed to the attainment of that tact and consummate skill which such careful and delicate operations require.

Once more—and I have done with this part of the subject—the photographer should be a person of taste and artistic perception. As the subject of artistic photography will, I expect, be brought before you by a far abler hand, it will not be necessary for me to dwell long on this point; but, as it forms one of the qualifications of a photographer, and a most important one, it was necessary for me to mention it. A knowledge, at least, of some of the principles and rules of art, is indispensable to any photographer who wishes to be something more than a mere dabbler in the art; for it matters not how skilled he may be in the scientific and manipulatory departments—if he is totally ignorant of what constitutes an artistic picture, he will never produce anything, except by mere accident, which will have any charms for persons superior in this respect to himself. I do not think it requisite, as some would seem to imply, that the photographer should be a trained artist, though, of course (as the gentleman said, when speaking of the many excellent virtues of his wife, who possessed, in addition, a considerable fortune, that the latter made her none the *worse*), he will be none the worse if he is one. I think it quite possible for a person possessing an artistic eye, and a knowledge of the general principles of composition, light and shadow, perspective, &c.—though he may not be able to sketch a landscape or paint a picture—to produce a photograph that shall likewise be a *picture* in every sense of the word. It may want, perhaps—nay, it certainly *will* want—those adventitious embellishments which are rarely found in nature, but which artists are wont to employ to adorn their drawings and paintings; but this, of course, the photographer cannot supply.

A photograph is simply the reflection of nature, and while everything that exists in nature (meaning, of course, in any particular view) is represented with absolute fidelity and precision, that which does not exist cannot, of course, be represented. Whether or not, by the rules of just and severe criticism, this is a defect in photography, is a question for artists to decide.

There should, however, be some allowance made for it when photographs are judged by the same principles as paintings. The photographer is bound to simple truth—happily, that is an important, if not the all important, principle in representation—he can neither add anything to adorn his picture, nor remove from it anything that is offensive, both of which privileges are in the power of the artist, and also his acknowledged rights. Hence it follows that if an artist and photographer should both select the same identical spot, as being the best possible point of view from which to depict a certain landscape, and should both take it when in the best position as regards light and shade, the two delineations may widely differ, some objects appearing in the painting which are not in the photograph, and others left out of the painting which are given in the photograph—the one sacrificing absolute fidelity to pictorial effect, the other appearing as the exact transcript of nature. The consequence of this may be that one picture shall be extolled as a meritorious production, while the other, though selected with equal judgment, and being a more truthful delineation of the scene, shall be condemned as a flat, unartistic production, casting a sad reflection on the poor unfortunate photographer.

But I am running away from my subject. Photographers should strive at any rate to make the most of what is in their power, and though they may not be able to satisfy the requirements of a scrupulous, not to say fastidious taste, they should endeavour to approach as near *perfection* as possible. So many difficulties are presented in the chemical and manipulative departments of his art, that the young photographer in his eager desire to master these, very frequently pays no attention to the artistic properties of his pictures, and is totally indifferent, if the photograph be perfect, whether the picture be a flaming red brick house in which he can count every brick, or an ivy covered ruin, "grey with antiquity," and "hoary with the years of time."

Such, I freely confess, was the case with myself, as those of you who have seen my earlier productions will not dispute. But I learned, and that at some cost, that what once pleased myself was far from giving pleasure to others; so having in some degree mastered the difficulties of manipulation, my ambition spurred me on to attempt to produce pictures which should be as much admired for their artistic qualities, as for their excellence viewed in a purely photographic light. How far I have hitherto succeeded in the attempt, you will have an opportunity of judging from the specimens on the table.

(*To be continued.*)

THE LIME LIGHT.

The importance to the photographer of an effective and cheap artificial light is so evident, that we look anxiously for any substitute for ordinary coal gas that may be presented to public attention. At present, the photographer avails himself of Mr. Moule's invention, "the Photogen," which, while it has its merits, has also its disadvantages. What the photographer requires, is a continuous, steady, vivid white light, capable of being sustained equably for an indefinite length of time. These conditions are, we believe, fulfilled by "a new Lime Light," exhibited last week at the meeting of the Society of Arts, a description of which was read by Mr. S. S. Baxter. The author gave a brief account of the principal sources of artificial light generally employed previous to the introduction of coal gas, which constituted the most substantial improvement in this respect that had been made in modern times. He thought, however, that if any evidence were required to confirm the necessity for still further advances in the production of a powerful and economical light, it would only be necessary to advert to the numerous attempts which had from time to time been made, at a great expenditure of time and money, with a view to achieve something as far surpassing gas as gas had already surpassed its predecessors. After touching upon the electric light, and pointing out the difficulties in the way of its general application, he passed to the more immediate subject of his paper. The lime light, produced by the jets of oxygen and hydrogen upon lime, had been extensively employed for many purposes where a light of short duration and great intensity was required. The late Lieutenant Drummond, as long ago as 1826, had made many important trials to establish it as a first-class light, and had been, to a certain extent, successful. He proposed to apply it to lighthouses, but from the imperfect state of the appliances at that time, its want of volume and continuity were fatal to its employment, and his proposition was not entertained by the authorities. The extensive and more important applications of the lime light required that a light should be produced of greater permanence than any hitherto obtained, and involved the necessity for providing for many successive hours' duration of the light with unvarying intensity. The lime, when exposed to the action of the heat produced by the combustion of the gases or the influence of the atmosphere, became cracked or decrepitated, and in this ruptured state, having no support, fell away from the jet of flame, and either rendered the light incon-

stant or entirely useless; for the ignited gases, without the presence of the lime, possess no illuminating power whatsoever, though they are in that state most powerful agents for the destructive separation of refractory substances. The remedy for these defects consists in inclosing the lime in a case or guard, both above and below the point of ignition, exposing only such portion of its surface as is required for the action of the gases; and protecting it from the action of the atmosphere as well as from falling away and extinguishing the light, should the lime by any accident crack, or become otherwise injured. The limes are as easily replaced as the wicks of a lamp, with the perfect continuity of the light for any reasonable period of time—a fortnight, or more, if necessary. Carburetted hydrogen is now employed instead of pure hydrogen. The extreme purity of the light eminently adapts it for interior illumination, as there is no evolution of deleterious gases or fumes, nor any abstraction of oxygen from the atmosphere; the requisite quantity for combustion being supplied by the apparatus itself. The cost of the lime light is said to be about one-half that of its equivalent gas light, all expenses being taken into consideration. There can be no doubt that the lime light is worthy the examination of photographers, and will, we hope, be found of real utility to them.

DIRECT TRANSPARENT POSITIVES FOR STEREOSCOPIC SLIDES.

BY M. POITEVIN.

This method is only an application of well-known principles, but as they have not been generally applied, it will not be uninteresting to our readers to follow the directions M. Poitevin has given for obtaining direct positives, both for stereoscopic slides (thus avoiding the difficulties of the usual albumen process), and for producing any number of negatives, which may be enlarged in the usual manner. This method is based on the following facts:—A film of iodide of silver, in presence of nitrate of silver and exposed to light, is blackened by pyrogallic acid. The same exposed film, washed to remove the nitrate of silver, and covered in the dark with a solution of iodide of potassium, again washed, and again covered with a solution of nitrate of silver, is also blackened by pyrogallic acid. The very brief action of light upon the film, previously exposed and re-covered with iodide, deprives it of the property of being blackened by pyrogallic acid. This understood, we may proceed as follows:—iodise the plate with a weakly iodised collodion; sensitise it, and expose the plate for a few seconds to diffused light; it does not become altered in appearance; remove the nitrate by washing the plate freely in water; pour over the plate, in the dark room, a solution of iodide of potassium, of the strength of four grains to one hundred of water; if the film has become dry, an alcoholic solution must be substituted for the aqueous solution of this salt. The film, acted upon by light, and thus re-covered with iodide of potassium, is very quickly influenced by the action of light, which deprives it of the property of being blackened by pyrogallic acid—the solution of iodide being removed, and replaced by nitrate of silver. The plate thus prepared is placed in the camera, to receive a direct or positive image: the exposure must be about three times as long as for an ordinary negative, with the same collodion. After exposure, the plate is washed in distilled water to remove the excess of iodide of potassium; it is then immersed in a weak solution of nitrate of silver, and treated with acidulated pyrogallic acid, which blackens only the parts not acted upon by light. In this manner a picture is obtained in which the chiar-oscuro is the exact counterpart of nature. By a process he has invented, M. Poitevin is able to print impressions from these transparent positives in ordinary printing ink. The citric or acetic acid, added to the pyrogallic acid in the developing solution, may be replaced by lactic acid.

Dictionary of Photography.

Litmus.—A colouring substance obtained from various lichens, especially *roccella tinctoria*, employed in the preparation of *test papers*. The plant, of a pale stone colour, grows on the rocks by the sea-shore in the Canary Islands. It yields a magnificent purple matter, which fixes in silk and wool without a mordant. It is reddened by acids, and rendered blue by alkalies.

The blue tincture of litmus is a true salt, resulting from the combination of a mineral base with a vegetable acid, which is red. When this tincture of litmus is acted upon by a strong acid, its base is removed, and the vegetable acid set free: this acid then manifests its own colour, a light red. But if the tincture is treated with a weak acid, only a part of its base is removed, and there remains a salt with excess of vegetable acid, which is of a purple colour. A soluble base, on the contrary, renders the red tincture of litmus *blue* (the coloured acid being free), because the base combines with the acid, and forms a blue salt. For the blue tincture to be as sensible as possible to acid, it is necessary that it be not mixed with an excess of free bases, for, if it is, the first portions of the acid added simply combine with the free base, and no reaction will be exercised upon the tincture until after the free base is completely saturated. So, also, for the red tincture to possess the greatest sensibility, with respect to bases, the blue tincture must be decomposed by a quantity of acid, just sufficient to isolate the red vegetable acid, and no other free acid be present in the liquor. The indications presented by these coloured tests are not absolute, but only relative. It may even happen that a substance will present an acid reaction with one colouring matter, and an alkaline reaction with another. Thus, boric acid turns the blue tincture of litmus purple, showing the reaction of a feeble acid, while it turns hematine blue, and, with reference to this last colouring material, shows a basic reaction. So, also, nitrate and acetate of lead turn the blue of litmus red, and that of hematine blue. The base of the tincture of litmus removing the acid from the two salts of lead, the coloured acid is set free, and, consequently, the blue turns red. The red acid of the hematine, on the contrary, removes the oxide of lead from the nitrate and acetate of lead, and produces a blue salt.

Sulphate of potassa does not act upon the tincture of litmus, because the sulphuric acid and the potassa are combined with so great an affinity that they cannot combine individually, either with the base or the acid of the coloured tincture; the latter, therefore, remains intact, and retains its primitive colour. But, if a colouring matter existed, the acid of which was so energetic as to remove the potassa from its sulphate, it is evident that this substance, in presence of sulphate of potassa, would exhibit the alkaline reaction.

Litmus is so delicate a test of the presence of sulphuric acid, that water, containing only a ten millionth part of acid, changes the colour of the test paper.

(*To be continued.*)

The Amateur Mechanic.

GLASS—(*continued*).

Before finally quitting the subject of glass, we have a few suggestions to add regarding tall bottles of small diameter, used as pouring bottles for collodion, and other purposes. The bottles sold as collodion pourers are somewhat expensive, and not always of the most suitable form; the large flanged cup-like aperture affording a lodgment for dust, pieces of hardened collodion film, &c. Common two-ounce phials, of the long shape, answer the purpose admirably in many respects, but with this drawback —for want of a broad base, they are easily knocked over, and are therefore inconvenient to work with. This inconvenience we saw very simply obviated the other day, in the operating-room of an ingenious friend, who had attached a foot or stand to each bottle of the kind, consisting of a flat circular piece of wood, two or three inches in diameter, with an aperture in the

centre into which the bottom of the bottle fitted sufficiently tight to retain its position when lifted about. Where it is at hand, gutta percha will be found lighter and more convenient, as well as more easy to manipulate and fashion to the required form and size than wood.

Capping and tying down.—Intimately connected with this subject is the capping and tying down of bottles, either for the better prevention of evaporation, or for securing corks and stoppers while travelling. The substances usually used for this purpose have been bladder or membrane, and thin white leather, or skiver, as we believe it is called; for many purposes parchment paper is likely to supersede both. The neatest in appearance is undoubtedly white leather; and where the mere securing of the cork or stopper from working out in travelling, or being blown out by the expansion of vapour, is the object in view, it is preferable, as most pleasant to use, and neatest in effect. It should be dipped in water previous to use, as it then the more easily plies to its proper position, and by its contraction on drying becomes tight and firm. Where the prevention of evaporation is important, however, it is not efficient, being very open and porous in texture. Bladder or membrane of any kind requires to be kept moist, as it is not readily softened again when once thoroughly dry and hard; it is also difficult to keep quite sweet, and is not, on these accounts, a desirable article to keep on hand merely for occasional use. Parchment paper is in all respects a valuable substitute for it, possessing most of its advantages, if not all, without its disadvantages. It should be used wet, in which condition it appears like wet parchment, and in drying, contracts sufficiently, and becomes rigid and firm. In all cases sufficient of the leather, &c., should be used to cover the stopper and neck of the bottle well, the superfluous parts being cut neatly away afterwards beneath the string.

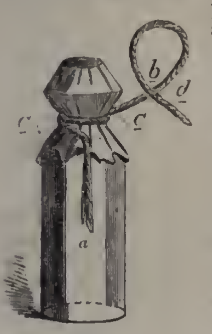


Fig. 1.

The simplest mode of securing the leather, &c., over the cork, is by what is usually termed the capping knot, and which, where especial security is not of importance, answers the purpose perfectly well. Notwithstanding that the mode of tying a knot seems a simple and trivial thing, we have seen many very clumsy attempts at knots for this purpose, and we shall not deem it entirely out of place, therefore, to offer a few suggestions on the subject. The capping knot may be made with one hand, whilst the bottle is held in the other. The cover being put over the cork or stopper, and pressed round it and well into the neck of the bottle, which is held in the left hand, the short end of the string *a* is placed under the thumb, while with the other hand the string is carried twice round the neck of the bottle; it is then formed into a loop as shown in Fig. 1, and the loop being held at *b* between the finger and the thumb, is thrown over the top of the bottle, and brought to the position of the dotted line *c c*, so as to pass over and compress the end *a* of the string; the end *d* is then pulled tight, and forms a knot sufficiently secure for most purposes where the greatest possible security is not important, especially where only small phials require capping. The preceding engraving shows the position of the hands in performing this operation:—

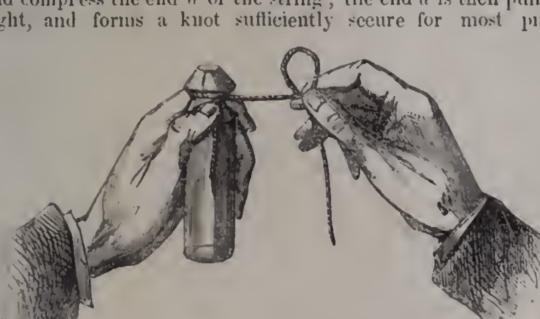


Fig. 2.

A more secure method, and almost as easily arranged, is found in the use of a slip-knot. A simple single knot is first tied at the end of the string; a slip-knot is then formed, the string lying in the form shown below:—

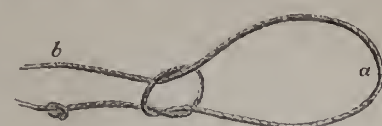


Fig. 3.

The large loop *a* is thrown over the top of the bottle, and the long end of the string *b* is pulled tight; it may then be further secured by making another knot round the short end.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 27th February, 1860.

The most active and indefatigable astronomical photographer in Paris is certainly M. Porro. I have frequently mentioned his happy applications of photography to astronomy and topography: his photometers, his microscopic apparatus, his great telescope, &c. Never does this remarkable man, who unites at once the profound knowledge of a distinguished *savant* and the genius of a great mechanical artist, let a single favourable opportunity pass unheeded. Twelve o'clock at night, on the 6th instant, everything was prepared in his observatory for studying and photographing the eclipse of the moon then about to take place. In company with M. Faye, the Parisian astronomer, and Dr. Gastaldi, an amateur photographer, M. Porro was awaiting the arrival of the interesting moment under the dome of the equatorial instrument, when a large beam fell upon his head and so severely hurt him as to render many of the interesting photographic experiments he was about to make absolutely impossible. In spite of this unfortunate accident, something was, however, done during the eclipse. The instruments prepared for the photographic essays were: the immense telescope with its objective of 32 centimètres opening (the largest known), a telescope of 25 centimètres aperture, and a Daguerrian apparatus with a stenallatic objective of 18 centimètres. The great telescope, notwithstanding its long focal distance of 15 mètres, gave some very good images on collodion plates (the time of exposure having varied from three to six seconds), from the beginning of the eclipse up to the moment of greatest obscurity; but, as the collodionised plate could not be made to follow the moon in its movement of one millimètre per second—M. Porro's accident having prevented him from adjusting and regulating the clock-apparatus that was intended to effect this—the images were superposed. The telescope of 25 centimètres aperture also gave very intense images in one second and a half's exposure at the commencement, and in four seconds at the maximum of the eclipse.

The stenallatic objective furnished very good images of the moon and the surrounding stars over a radius of seven or eight degrees, and with an exposure of less than one second, that is, almost instantaneously.

Le Cosmos, in speaking of the latter phenomenon, says:—"This is a fact of great importance, and of which we hasten to take notice, as it is certain to be utilised on a large scale in the astronomical determinations of longitudes, and will furnish us with a new means of perfecting the theory of the moon, and of verifying the figures of the lunar tables." You will appreciate these lines better when I remind you, that during the eclipse of the sun on the 15th March, 1858, M. Porro, although the day was very cloudy, took many excellent negatives; and, by the aid of a microscopical apparatus, constructed for the purpose, he measured the distances from the points of the crescents to their centres. Will you believe me, when I tell you that M. Faye, after having submitted these measures to a rigorous verification,

pronounced them to be a hundred times more exact than micrometrical measurements taken at the eye-piece of an astronomical telescope!

The same exactitude will evidently be found to exist in the determination of the distances from the moon to the various stars on the photographic images alluded to above.

M. Ernest Guignet has made an interesting study of that new and remarkable colouring matter termed *fuchsine*. This substance was obtained a short time ago from aniline, by MM. Renard and Franc, of Lyons, who found that it was capable of dyeing silk and albumenised cotton a most beautiful carmine red, of many tints. Unfortunately, light has a tendency to destroy these tints, but they are such striking colours, that fuchsine will certainly be largely employed.

MM. Renard and Franc prepare fuchsine by the action of anhydrous bichloride of tin upon aniline. Other chlorides may be employed for the same purpose, especially bichloride of mercury. A substance very like fuchsine has been recently obtained by adding hydrochloric acid to a mixture of aniline and pyroligneous acid. It is produced by either of these methods as a viscid matter, which soon becomes solid; it dissolves in alcohol, producing a bright red solution, and is also slightly soluble in ether and sulphide of carbon. Boiling water will also dissolve a certain quantity, assuming a red colour, and letting the colouring matter deposit on cooling in form of scales. Nitric, hydrochloric, and sulphuric acids dissolve it, and form yellow solutions; that produced by nitric acid becomes red, by the addition of water and precipitates with nitrate of silver, showing the presence of chlorine in the compound. With the other acids certain organic salts are formed, but have not been examined. For instance, if fuchsine be dissolved in hydrochloric acid, the yellow solution obtained deposits brown prismatic crystals. The same salt is also deposited as carmine precipitate, when the above solution is exactly saturated with ammonia. When an excess of ammonia, or when potash comes in contact with this substance, it is completely bleached. In the same manner, potash or soda completely bleaches cotton that has been dyed with fuchsine, but the colour returns on the addition of water or an acid.

M. Guignet supposes that the base of fuchsine is: $C_{12}H_7(Cl)Az_2$ (aniline being $C_{12}H_7Az$), and that fuchsine itself is a mixture of this base and its hydrochlorate; but this supposition is not yet based upon analysis.

"The base of fuchsine," says our author, "appears to me to resemble nitrazophenylamin, obtained formerly by M. Gottlieb, by reducing dinitraniline by sulphydrate of ammonia. As to dinitraniline, the same chemist prepared it by treating with carbonate of soda a substance called *dinitrophenylcitraconimide*, which he prepared by the action of a mixture of nitric and sulphuric acids on phenylcitraconimide, a product resulting from the action of anhydrous citraconic acid on aniline."

MR. MAXWELL-LYTE'S METAGELATINE PROCESS.

To the Editor of the "PHOTOGRAPHIC NEWS."

SIR,—In your number of February 17, I see a request from "W." that I would send you the details of my metagelatine process, as I now employ it; a request I the more readily comply with, as I feel it is a process requiring only to be known, to become universally adopted.

1. *To Prepare Metagelatine.*—Soak 500 parts of fine gelatine in a pan of cold rain-water till it becomes thoroughly saturated and softened; then lift it out and throw it on a sieve to drain. Place it in a porcelain-lined saucepan, or, if that be not at hand, one of common tinned copper, and warm it up over a slow fire till melted, and then heat it to boiling; then add 100 parts of pure oxalic acid, cover the saucepan, and let it boil again slowly for one hour. Remove the saucepan from the fire, and while the liquid is still hot, pour out into a capacious basin, and neutralise the acid it contains with chalk. The point of neutralisation is known to be arrived at, by a further addition of chalk ceasing to cause effervescence. Care should be taken to add the chalk gradually, so that the liquid may not run over the sides of the vessel. The liquid is now to be separated from the sediment of oxalate of lime, by allowing it to subside, and drawing off the clear liquid with a siphon, or, more quickly still, by straining through a linen cloth. Any way, the liquid is still milky from suspended oxalate of lime, and in order to render it quite clear, the whites of three eggs should be beaten up with their own bulk of water and added to it, and the whole once more brought up to boiling, when the white of egg coagulates, and catches up all the suspended oxalate of lime, and the liquid being again filtered passes quite clear. It ought to be about the colour of sherry. The filtered liquid is now to be mixed with $\frac{1}{6}$th of its bulk of alcohol, and being stored away in bottles, it will keep indefinitely.

2. *Cleaning the Plates.*—Soak the glass plates for an hour in a solution of carbonate of soda, prepared by adding a teacupful of common washing soda to a quart of water; lift them out and rub them with some tripoli powder, and then rinse them in a stream of running water, and wipe them dry with a clean cloth. The cloths should be cleaned by boiling them in a solution of soda like that above described, and afterwards rinsing in pure water. The plates should be cleaned an hour before using, and should be kept in a very dry situation; and it is almost needless to say, that the laboratory in which dry collodion plates are prepared, should be free from vapours, dry, and well-ventilated; and, on account of the long time the plate is exposed during its preparation, more than usual care should be given to the lighting of the room, so as to secure a light of uniform yellow colour. Paper may be stained of a very suitable yellow by painting it over with the tincture of turmeric.

3. *Preparation and Application of the Collodion.*—Pyroxyline, 45 to 70 grains, according as the specimen used, is more or less soluble.

Ether rectified	14 fluid ounces.
Alcohol, absolute	6 ,, ,,
Iodide of Cadmium...	30 grains.
Iod de of Ammonium	20 ,,
Bromide of Ammonium	20 ,,

The pyroxyline is to be placed in the ether, which should be so strong as not to dissolve it, and the bromide and iodides dissolved in the alcohol, and the two poured together and agitated till the pyroxyline is dissolved. This collodion is much better, and less liable to blister, after it has been kept some time; and I may add, that during very hot weather it may be found advisable to increase the proportion of alcohol to that of the ether in the collodion; and on the other hand, during cold weather the quantity of alcohol may be diminished, and that of the ether relatively increased. Any how, after applying the collodion it should be allowed to evaporate rather longer than usual before dipping, so as to consolidate the film, and make it adherent in order to avoid blistering; and with a view to prevent the evaporation from being unequal, the following precautions should be observed:—The plate should not be held in the fingers, but on a plate-holder; and as soon as the collodion ceases to drip, and begins to set on the lower edge of the plate, it must be turned round, and held slanting-wise, but face upwards, so that the corner at which the collodion was poured off shall be uppermost, and the opposite corner lowest. By this means, the vapour of the ether flows back over the plate, and prevents the complete drying of that corner at which the collodion was poured on (and which would otherwise dry too quickly) until that at which it was poured off becomes set, and ready for immersion.

4. *Sensitising the Plate, and the Application of the Metagelatine.*—Three baths are to be prepared for the reception of the plate, into which it must be passed successively:—1st. The ordinary nitrate bath; 2nd. Distilled water; 3rd. Composed as follows:—

Metagelatine solution	250 parts by measure.
Syrupy lactic acid	5, or 5 glacial acetic acid.
Water	1000 parts by measure.
Nitrate of silver	1 part.

The plate is to be left in No. 1 for five or ten minutes, or till thoroughly sensitised; in No. 2 it is to be passed up and down just twice or three times, so as to wash off most of the adherent, but not the combined, nitrate; and in No. 3 it is to be kept for five or ten minutes, frequently moving it about, so as to insure an equal and complete absorption of the metagelatine solution. In cold weather, or if more intensity be desired in the negatives, five parts by measure of oxymel may be added

to the above bath of diluted metagelatine; but I prefer using it pure. The reason why I employ the lactic acid is, that while it seems hardly to retard the sensibility, or to cause such intense blacks as the citric acid, it is not volatile like acetic acid; indeed, I believe it to be peculiarly suited for use in all dry processes, whether paper or collodion, as an efficient substitute for the more volatile acetic acid. On removing the plate from the metagelatine bath, it may be put, standing on its corner, in a dark place, and resting on a piece of blotting paper, for a few minutes, and then placed in the drying-box. This box may be made of Honduras mahogany, or of poplar, or lime wood (*but not of deal*), and lined with paper, several folds of blotting-paper being placed in the bottom, and a flat basin in the centre, containing some oil of vitriol, which must be renewed from time to time. The affinity of the sulphuric acid for water keeps the atmosphere of the interior of the box free from moisture, and considerably accelerates the drying of the plates. The sulphuric acid also acts beneficially in purifying the air of the box from many other vapours and gases, as well as from watery vapour. Great care must be taken to keep the plate free from all gases, such as ammonia, chlorine, sulphurous acid, and sulphuretted hydrogen, and also from the vapours of turpentine, and of all the essential oils. We should, therefore, scrupulously avoid preparing dry plates in the presence of emanations from stables, or of any organic matter in a state of decomposition; and, also, all the strong smelling woods should be avoided when we wish to make a box for storing plates away; and no varnish or drying oils should be brought near them. Let the plate dry completely before using.

5. *Exposure, Development, Fixing, &c. &c.*—The exposure must be regulated according to the system of development to be employed, whether it be by iron, or otherwise.

For a stereoscopic plate taken with a Ross's landscape lens, and a diaphragm of ¼-inch diameter, the exposure may be forty seconds to one minute on a bright day, if it is to be developed with iron; or three to three and a half minutes if developed with pyrogallic acid. The development of metagelatine plates is slower than that of wet collodion, and, according to the temperature which exists, I employ either iron, pyrogallic, or gallic acid.

1. Iron developer :—

Sulphate of iron	150 grains.
Glacial acetic acid	2 drachms.
Distilled or rain water	16 ounces.

2. Pyrogallic developer :—

Pyrogallic acid	15 grains.
Glacial acetic acid	2½ drachms.
Water	16 ounces.

3. Gallic acid solution saturated in pure water.
4. A solution of nitrate of silver one per cent.

In cold weather, the picture may be treated as follows:—Lay the plate on a levelling stand, and having covered its surface with water and poured it off again, pour on some of No. 1; pour a little nitrate of silver solution, No. 4, into the glass, and then pour back the liquid off the plate into the same glass, so as to mix with the nitrate, and pour this off and on to the plate till all the details of the proof are developed. The plate being then washed, the picture may be strengthened, if necessary, with some of solution No. 2, which has been mixed with some free nitrate.

During warm weather, it is better to develop with No. 2 solution, and strengthen the proof with No. 4; or the picture may be brought out by laying it in solution No. 3, in a porcelain dish, just in the same way as a paper proof is developed.

In order to avoid the necessity of constantly weighing out the pyrogallic acid, a solution may be made in the proportion of 1 oz. of pyrogallic acid to 4 ozs. of alcohol; 4 minims of this liquid will then exactly represent 1 grain of the solid acid; and as the solution keeps indefinitely, provided the alcohol be tolerably strong and pure, this method will be found very convenient.

The same method of preserving gallic acid has already been given in the "PHOTOGRAPHIC NEWS," but it answers equally well for pyrogallic acid.—I am, Sir, your obedient servant,

F. MAXWELL-LYTE.

Bagnères de Bigorre, February 22nd, 1860.

Proceedings of Societies.

ARCHITECTURAL PHOTOGRAPHIC ASSOCIATION.

THE weekly lecture in connection with the exhibition of photographs by this Society was delivered at the rooms, No. 9, Conduit-street, on Tuesday evening, February 28, by Mr. FERGUSSON, "On the Photographs of Jerusalem."

Mr. MAIR occupied the chair. He said that it had been announced that their President, Mr. Tite, M.P., would preside on that occasion, but his parliamentary duties had prevented him from doing so. In his absence he (the chairman) had been requested to introduce Mr. Fergusson, who, he had no doubt, would deliver them an instructive and entertaining lecture.

Mr. FERGUSSON, before making any remarks on the subject of his lecture, begged to be allowed to explain why the Committee of the Institution had requested him, who had never been in Jerusalem, to discourse upon the photographs which they saw upon the walls. A good many years ago he had travelled in the East, and visited a great many countries occupied by the Mohammedan people, with a view to study architecture, and the Mohammedan style had occupied much of his attention. He had studied in Persia, Spain, and other countries, and during his researches, though he was not able to master, yet he made himself conversant with, the general features of Mohammedan buildings. One structure, however, he could not comprehend—the Mosque of Omar, at Jerusalem. This building was the most important in the place—it could be seen from every other quarter, and was, in fact, as much *the great* building of Jerusalem as St. Paul's was of London. It was, however, no mosque. A mosque was simply a niche in the wall, or anything that opened towards Mecca; for one of the chief precepts of the Mohammedan religion was, that the faithful, when engaged in prayer, should turn their faces towards that city. Those in the east turned towards the west, those in Spain towards the east, and those in Jerusalem towards the south. The Mosque of Omar was an octagonal building, circular in the centre, and having four doors. The principal door was in the south, and when a worshipper entered the building he must turn his back towards the mosque, and his devotional exercises were also liable to be interrupted from the position he would have to occupy. Thus, any one at all familiar with Mohammedan feelings must have seen that it could not have been a mosque. He had taken great pains to ascertain what it was, but the question still remained unsolved. Some twelve years ago, he heard that Messrs. Catherwood, Arundell, and Bonomi, had made careful drawings of the building, and he obtained an introduction to these gentlemen, who kindly offered to show him the drawings. After carefully examining them, he handed them back to Mr. Arundell, at the same time asking him what it was. Mr. Arundell replied that it was the Mosque of Omar—that it was built by Omar. He (the lecturer) at once said, "That was built long before Omar was born. That is a Christian building, of the age of Constantine." After a most careful study of the subject, he still remained of the same opinion. Every one was aware that the date of a building could be perfectly ascertained from its style; and any one at all conversant with methodic architecture could at once tell to what period it belonged, whether to the eighth, ninth, or twelfth century. The Golden Gate he believed to belong to an early age. The Church of the Holy Sepulchre stood in the middle of the city, and was completely surrounded on all sides by houses, and this circumstance had given rise to very strong doubts as to this being the true site of the Holy Sepulchre. Since the time of the first person who published a book on the subject, many people, both Catholics and Protestants, had expressed strong doubts of the site as selected. On the other hand, it was argued by many inquirers that there was no difficulty with regard to the site, for the historian, who lived at a period when the tradition was not old, must have known; and they asserted that the fact of the church having been built upon the spot by Constantine was a confirmation of the tradition. But when he had made, as he thought, this discovery, the question which arose was this:—Here was a church formed exactly of a character as described by Eusebius, and others of the time of Constantine, and the whole of the circular front of the dome is occupied by a great mass of the living rock of the country, which rose above the floor of the church, and in that rock was one single cave. The

question then arose—What church could this be, except that of the Holy Sepulchre? There was no doubt that the tradition was lost at the time of the Crusades, and from that period the building was entirely of modern architecture. But with some weight it might be said, "What does Mr. Fergusson know of Jerusalem? He has never been there." True, he had never been to Jerusalem; but, if he could not go to Jerusalem, Jerusalem could come to him. Photography would furnish all who wished to study the matter with authorities quite as authentic—as to the effects upon the buildings—as the works of the historians; and they bore out every assertion he had made. Every photograph he had seen confirmed fully the drawings made by Messrs. Catherwood, Arundell, and Bonomi. One interesting point which photography had brought out was, that the whole of the arches were rounded, and the building was covered with titles and inscriptions, which were certainly of early date, but, on looking carefully at the building, it would be found to be of the Constantinic style. The lecturer then referred to the Byzantine arch, which he said exhibited the round arch as distinctly as possible, and was covered with inscriptions of the time of Omar, the stones of which, it was quite possible, had been inserted in the old form. The Mohammedan characters were of a purely modern date. Ciaphus said, that a dome was built over the sacred rock, but a basilica was also built, which belonged to the church, but had no connection with the circular building, and that it had a handsome gateway opening upon the market-place. The Golden Gate was not a gateway of the city. It consisted of two arches, with a Corinthian pillar down the centre, while a gateway to a city was constructed so as to resist, and had inclosures and fortifications, but never a pillar in the centre. This gateway was undoubtedly of the age of Constantine; and it was so placed with reference to the Church of the Holy Sepulchre, that there was very little doubt that it was the gate of the basilica. Another thing that photography had done was to exhibit the courses in the entrance to the Holy Sepulchre. The lecturer took a cursory glance at some of the other peculiarities connected with the architecture of Jerusalem, referring to the site of Solomon's Temple, and the attempt to rebuild the Temple in the time of Julian by the Jews, and their discomfiture by fire from heaven, earthquakes, and other supernatural agencies. He pointed out the advantages which photography offered to the architect as well as to the student; and concluded by saying that he would be glad to afford any further information upon the subject.

The Chairman said they had no doubt derived very much pleasure from the remarks of Mr. Fergusson, and he had therefore now to propose that their best thanks be accorded to him. (Applause.) He announced that the next lecture would be given on next Tuesday evening by Mr. Burgess.

The meeting then separated.

North London Photographic Society.

The ordinary monthly meeting of this society was held at Myddleton Hall, Islington, on Wednesday, February 29th. Mr. G. Shadbolt, vice-president, occupied the chair, and the attendance was numerous.

The minutes of the previous meeting were read and confirmed, Mr. W. Shave acting as secretary, in the unavoidable absence of Mr. J. Barnett.

Mr. T. A. Barber read a letter from Mr. Oakshot of Ryde, from which we take the following extracts:—

"I see that the subject of discussion, at the last meeting of the North London Society, was a paper read by Mr. Hughes on the 'Alkaline Gold Toning Bath.' I observe, also, that Mr. Hardwich was present, and that, in his remarks, he stated he had used one fixing bath of hyposulphite of soda all through last summer. On reading this, I was not a little surprised that no one present called attention to the experiments of the French chemists (Messrs. Davanne and Girard) on this very point, now being reported in the 'Photographic News.'

"These experiments, if correctly given, seem to me all-important, as they appear to throw especial light on that annoyance to photographers—the gradual change of paper prints; and they will, perhaps, in some measure, explain why certain prints seem permanent and others transient, when, according to appearance, all were treated alike.

"Of course you see the 'News.' If you refer to the last two or three numbers, you will find that Messrs. Davanne and Girard assert positively that a quart of hyposulphite solution, 10 per cent., will fix only one and a half sheets of paper: this, in plain figures, means, if my calculation be correct, that 4 oz. of crystallised hyposulphite will only just fix ten pictures $8\frac{1}{2} \times 6\frac{1}{2}$. Then this number of prints will saturate the above quantity of hyposulphite of soda with hyposulphite of silver; and, if more than this number of prints be passed into the same solution, there is a certainty that an injurious element will be left in the paper, and sooner or later infallibly destroy the print. I fancy most photographers expect more work out of hyposulphite even when new than, if these chemists are right, it seems able to give."

The letter went on to refer to a communication by Mr. Hardwich to a photographic contemporary, recommending an economical method of working the alkaline gold bath by precipitating the unused gold by protosulphite of iron. Mr. Oakshot stated that he had adopted with success the plan of allowing the gold to reduce itself, using the same solution over again, and merely adding a little fresh gold with each fresh set of prints, and occasionally a little more carbonate of soda. The inside of the bottle became gradually coated with a black deposit of gold, which could be easily recovered by dissolving it in nitro-muriatic acid.

Considerable discussion ensued upon the points raised by the letter, in the course of which,

Mr. Hughes observed that the writer was under a misapprehension as to what had fallen from Mr. Hardwich, in reference to the hyposulphite bath. Mr. Hardwich explained, that while he might be said to have used the same bath throughout the summer, it was practically always new, as fresh crystals of hyposulphite of soda were continually added. The plan adopted by Mr. Hardwich was to start with a saturated, or, at least, a very concentrated, solution of hyposulphite, which, in the first instance, would dissolve the gold off the surface of the prints. In a short time this effect ceased to be produced, and the solution toned the prints to the required colour without injuring them. This was the only difficulty to be encountered in using the alkaline gold solution, and to meet it he added more hyposulphite, to keep up the strength of the old bath, in preference to making a new one. By this means the sulphurating action was avoided without losing the rich tone of the prints which it was so desirable to obtain. With regard to using the gold solution over and over again, Mr. Hughes expressed the opinion, that as much would be lost as gained by this means, as the decomposition of the solution would be more rapid.

Mr. Barber inquired whether any black deposit appeared in the hypo. bath by keeping.

Mr. Hughes said there was nothing but what might arise from dirt—nothing resembling a black sulphide.

The Chairman said that the measly spots which appeared on prints not properly fixed, were due to something more than chloride of silver left in the paper, as they would not yield to bi-sulphide of carbon. If they were placed in a saturated solution of hyposulphite of soda, and left long enough to dissolve the chloride of silver, the spots were only increased.

Mr. Hughes agreed with the Chairman, that the spots were not chloride of silver. They were probably produced by a dilute hypo. bath.

The Chairman thought that long soaking having dissolved the size, some of the chloride of silver might unite with the soft size and produce the appearances complained of.

Mr. Hughes had observed the effect to be produced only by old hyposulphite.

The Chairman said he had proved by experiment that the effect could be produced by new.

Mr. Dawson said that he adopted the same process as that of Mr. Hughes: keeping the hypo. bath saturated, and, after toning, putting in a piece of chalk, or a marble, to keep the bath neutral. In summer, it was necessary to be very careful, as the solution soon became acid. He, on one occasion, placed on a stove a bath which was decidedly alkaline; so rapid was the change produced by the heat, that in ten minutes the prints got sulphurised. He believed there was a great waste of gold in the solutions usually employed. Mr. Wilson, of Aberdeen, was toning 50 or 60 prints with 15 grains of gold, which, in his (Mr. Dawson's) opinion, was enough for 400. By using more water, and warming it, the same tone would be obtained with much less gold than was ordinarily employed.

The Chairman said, he believed that most operators washed their prints an enormous time too long after fixing.

Mr. D. W. Hill had observed some prints to become sensibly browner in the shadows after long soaking.

Mr. Shave said that the evils of long washing were admitted, and mechanical means had been suggested to obviate them.

The Chairman thought mechanical washing had been intended rather to save trouble. He had adopted the plan of hanging up the print by one corner for a few minutes, after lifting it out of the hypo. bath, thus draining off a considerable portion of fluid before re-washing. He considered one hour's washing on this plan to be abundance.

Mr. Dawson agreed with the Chairman, that the washing might be done in a shorter time than was usually the case. It was a common thing to put a number of prints under a tap all night, and next morning many of them would be found stuck together, so that the water had not acted upon them at all. His practice was to place say 100 stereo. prints into a large dish holding 3 or 4 gallons of water, stir them round very well, then pour off the water and hold up the dish to drain; this having been done six times, it would only be necessary to change the water two or three times more in two hours, which time he thought sufficient.

Mr. Hughes observed that the weak point of the paper processes was, the necessity of using hyposulphite of soda, and photography would be in an imperfect state until some more sure and rapid agent was found to supersede it. M. de Molard, a Frenchman, had employed a fixing agent which he called iodo-cyanide of potassium, and which was cyanide of potassium saturated with iodine.

Some conversation followed on the various agents which from time to time had been proposed as substitutes for hyposulphite of soda, and the subject dropped.

The Chairman announced that the nomination of the officers of the society for the ensuing year would take place at the present meeting, and the election at the annual meeting on the 28th of March. The retiring officers were eligible for re-election.

The names of various gentlemen nominated to serve on the committee were handed in, and the proceedings terminated.

Nottingham Photographic Society.

The ordinary meeting of this Society took place on Wednesday evening, February 29th.

The Chairman, in opening the proceedings, congratulated the members present upon the gradual and successful progress which the Society was making. He was happy to be able to inform them that the previous lecture, delivered by Mr. S. Bourne, had been so highly appreciated, that the London journal, the "Photographic News," had published it *in extenso*. (Applause.) The Chairman then introduced Mr. Steegmann to the Meeting, as the veteran photographer of the Society, not doubting that the lecture which he had kindly undertaken to deliver would prove interesting.

Mr. Edward Steegmann read a paper giving a brief History of the Art of Photography, from its discovery to the present time. After alluding to the observations made by Scheele, Ritter, Davy, Wedgwood, and others, on the blackening of chloride of silver under the action of light, he observed that photography dates its invention from the discovery of the camera-obscura by Baptista Porta, in the sixteenth century. The desire to fix the images obtained in this instrument must have been felt by every one who made use of it. At length a scientific artist, Daguerre, set himself seriously to work to obtain this marvellous but unhoped-for result. In conjunction with M. Nièpce, who was engaged in experiments for engraving by the agency of light, he at length succeeded in perfecting the greatest marvel of modern times, the process of obtaining the pictures of the camera on metal plates, to which the name of Daguerreotype has been appropriately given. From the date of that discovery to the present time, daily improvements have been made, till now the art of heliography, or photography, lacks only colour to perfect it. The present perfected state of the art is due as much to the labours and researches of Mr. Fox Talbot, as to those of M. Daguerre. The calotype is the parent of all our processes on paper, however much they may vary from the type with which Mr. Talbot started. The main-spring of the photographic art of the present day is collodion, the honours of the introduction of which must be divided between M. de Gray and Mr. F. Scott Archer. To M. Nièpce de Saint Victor is due the merit of introducing albumen and glass plates. Mr. Steegmann next dwelt upon the relations between art and photography. At first, artists looked upon photography with an envious and jealous eye. They could not see in it an ally, but only a foe. Some among them, however, were capable of appreciating its value to art. Mr. Delaroche considered it as carrying to such perfection certain of the essential principles of art, that they must become subjects of study and observation, even to the most accomplished artist. The inconceivable minuteness of finish in no respects disturbs the repose of the masses, nor in any degree impairs the general effect. The accuracy of the lines — he continues—the precision of the forms in the designs, are as perfect as they possibly can be, and yet at the same time we discover in them a bold and energetic manner, and an *ensemble* as rich in tone as in effect. By this process, the painter will obtain a quick method of forming collections of studies, which he could not otherwise procure without much time and labour, and in a style very far inferior, whatever might be his talents in other respects. Mr. Steegmann next alluded to the processes of heliographic engraving, to the importance of improved artificial light, and to the invention of the stereoscope; subjects which have been fully described in our pages, and therefore need not be recapitulated. In conclusion, he inquired what effect photography would have upon the artist's calling—his conclusion being that it will deliver Art from much mediocrity.

The reading of the paper having been concluded,

The Chairman invited the audience to a discussion of the subject which had been brought under their notice.

After some conversation, however, it was resolved that the discussion be adjourned to a special meeting.

Mr. Berenhart moved the thanks of the meeting to Mr. Steegmann for his lecture. Though no photographer himself, he felt so much interest in the art, that he was glad to have had the opportunity of being present. The lecture was as instructive as it was interesting.

Mr. Beadmore seconded the motion.

Mr. Bourne, in supporting the motion, said that Mr. Steegmann in his opening address had expressed a fear that his paper would fall short of the merit of that which he (Mr. Bourne) had read. But that fear was groundless, for the lecture they had just heard surpassed his own, and the Society, he was convinced, would feel much indebted to Mr. Steegmann.

The motion having been carried unanimously, was acknowledged by Mr. Steegmann in suitable terms, and the ordinary vote of thanks to the chairman terminated the proceedings.

Exhibitions.

The Liverpool Society of Arts announce that in April next they will open an Exhibition of Works by eminent Ancient and Modern Artists, contributed from private collections, and also of proof engravings and photographs. The Photographic Section of the Historic Society of Lancashire and Cheshire have decided to lend their co-operation, in order that the Photographic Department of the intended Exhibition may fairly represent the advanced stage of progress to which that art has attained. The Exhibition will open on the 2nd of April. Contributions to be sent to Mr. James Bourlet, 10, Foley Street, Portland Place, W., not later than the 19th inst., or to the Exhibition Rooms, Queen's Hall, Bold Street, Liverpool, not later than the 24th inst.

New Photographic Apparatus.

Newton's Patent for an Apparatus for Exhibiting Stereoscopic Pictures.

This invention relates to an apparatus for exhibiting stereoscopic pictures, in which the pictures are conveyed automatically from the interior of the box or case to the place where they are to be inspected, and returned to the box again after they have been inspected or exhibited; or in other words, the apparatus contains the pictures within it, and brings them to the outside to be exhibited, and then returns them again. It consists of a box or case, upon the

top or sides of which (though it may be at either of the sides, if so preferred) is a frame into which the picture may be brought when it is to be inspected. On each side of this frame may be arranged two other frames for containing lenses properly mounted in an inner frame, that can be moved in or out of the stationary frame by a thumbscrew, for the purpose of changing the focus to suit the eye of the person examining the pictures. By this arrangement of frame and lenses, two persons may examine pictures at the same time, the pictures being placed, or clamped, or glued, in pairs so as to face both ways or towards both lenses. The mechanism is worked by a crank. Within the outer case or box is the picture holder, which may be cylindrical in form, and divided by proper partitions into a series of compartments, or divisions.

Photographic Notes and Queries.

GLACIAL ACETIC ACID.

Sir,—It has always been an understood fact, that the bath solution, either negative or positive, produces better and cleaner pictures when slightly acid, and that for negatives, the preference should be given to glacial acetic. Such has been my principle and practice for nearly eight years; but, after all, I am at fault.

The generality of glacial acetic acid, crystalised or otherwise, now vended, invariably contains some kind of organic matter, and which, on coming in contact with the nitrate bath, will (in two hours, in the dark) spoil the best bath ever made, and from which, no matter how you doctor it, a good picture can never be had from it. I have quarts of it now, the plates prepared in which fog all over the moment the developer is applied. Being engaged in teaching and in the production of a large number of negatives, both wet and dry, I have lately been compelled to procure acid from several respectable houses on trial, and have found some very pure; others, on dropping in one minim in an ounce of nitrate solution, have turned grey in ten minutes and black in an hour; while others cause the film to crack, and some to blister and peal off. I am not disposed to be angry with the vendors of this article, but with the manufacturers, although there is a strong temptation to add common acetic or other acids to the glacial, when in a liquid state, for extra profit. I cannot see how the shopkeeper can add anything when in the crystal state.

The favour, therefore, I ask, in the name of myself and brother photographers, is, Can you give us a simple and safe test, so that, when we purchase glacial acetic acid, we may be certain it is pure, and contains no other substance calculated to injure the bath solution? A. C. P.

P.S.—With regard to gutta-percha baths, if the subject is not exhausted, and you think a correct solution of those extraordinary enigmas worth having, I believe I can inform your readers the reason why the bath solution may remain in a gutta-percha bath for years and not be affected, and, in the next new one they purchase, be spoiled in an hour's use.

To the Editor of the "Photographic News."

Sir,—I gratefully thank your correspondent, "O," for his excellent process of positive printing, given in vol. i. p. 86, and afterwards more fully explained. I have followed it faithfully, and find it all that can be desired. He would oblige many amateurs by giving his opinion as to the addition of a solution of chloride of lime or soda, as advised by Mr. Wentworth Scott, vol. ii. p. 26, and 185, *ut supra*.

The main object of my writing now is to learn from "O" if the method of printing by development, as given by him, vol. ii. p. 49, is suitable for taking negatives by the camera; or, if it is not, would he kindly lend his aid to enable photographers to do so? I refer to his method of chloride of ammonium and citrate of soda.—Your obedient servant,

Glasgow, February 25, 1860. Grateful.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Friday,	Mar.	2—Norwich Photographic Society.
Tuesday,	,,	6—London Photographic Society. Architectural Photographic Society,—Lecture at Eight o'clock.
Wednesday,	,,	7—Manchester Photographic Society.
Tuesday,	,,	13—Photographic Society of Scotland.
Wednesday,	,,	14—Chorlton Photographic Society.
Thursday,	,,	15—South London Photographic Society.
Monday,	,,	19—Blackheath Photographic Society.
Tuesday,	,,	27—Birmingham Photographic Society.
Wednesday,	,,	28—North London Photographic Society,—Annual Meeting.
Friday,	,,	30—Photographic Society of Ireland.

TO CORRESPONDENTS.

To our Subscribers.—*In future the Volumes of the* "Photographic News" *will consist of Eight months' numbers, and consequently the Index to the present Volume will be published on the 27th of April. This arrangement has been made in compliance with the expressed wish of numerous subscribers.*

T. P.—A very excellent liquid cement for uniting pieces of horn, pearl, bone, ivory, or shell, can be made by dissolving one ounce of gelatine in one ounce of strong vinegar (Beaufoy's), adding two drachms of alcohol, and a pinch of powdered alum. The bottle, containing these ingredients, must be placed in a vessel of hot water until they are dissolved, stirring frequently.

A Very Young Photographer.—1. There is no material difference except in the price. 2. The best place for the diaphragm is between the lenses, as in "Waterhouse's stop." 3. Orthoscopic is a misnomer, in that case. 4. Any portable contrivance that will exclude the light during the operation; a yellow calico bag, for instance.

Excelsior.—1. The colour you object to is probably due to the collodion, not to the bath. Try another sample. 2. Do not use nitrate of potash. 3. If we can find a specimen, it shall be forwarded. 4. If you use an ordinary hydrometer, it ought to answer for both solutions.

W. A.—An easy way of obtaining anhydrous alcohol, consists in filling a bladder with spirits of wine, and suspending it, securely tied, in a warm room; the water evaporates through the bladder, leaving the strong spirit behind.

E. H.—1. Your collodion has probably become decomposed. Obtain a fresh sample. 2. You can obtain them as direct positives, by a process given in the present number. 3. The objectives by the maker named are considered very satisfactory by those who use them.

Magna Charta.—1. A pair of single stereoscopic lenses. 2. The apparent size of the disc is due to irradiation. 3. They are printed from one negative, not from two or three, as you suppose.

D. D.—The cyanide of potassium of commerce is of very uncertain strength. You must ascertain the strength of your sample by experiment. It is better to use it too weak than too strong.

R. S.—Make a solution of pyrogallic acid, one ounce, in four ounces of alcohol. Four drops of this solution represent one grain of pyrogallic acid. If the alcohol be strong and pure, it will keep any length of time.

J. Chalmers.—There are several series of portraits of public characters in course of publication. You cannot expect to procure copies of private individuals.

Old Hypo.—It is best to wash your proofs in clean water upon removing them from the printing frame, to remove as much of the free nitrate of silver as possible.

Troy.—A minim does not weigh exactly a grain. The imperial minim of water weighs 91-100ths of a grain; and the fluid drachm, 54·7 grains—not 60.

Gustavus.—The best portfolio for drawings and photographs is that invented by Mr. Harvey, of Rathbone Place.

Albumen.—Fothergill's plates must be cleaned with hyposulphite of soda. If you use cyanide of potassium you will spoil your negatives.

Edward E.—Your question is answered in the paper on fixing positive proofs in the present number.

Chrome Yellow.—We have *seen* no photographs taken in natural colours, although we have heard of them frequently.

A. Z.—Your reference is incorrect; there is nothing on the subject alluded to in the Number for October 14, 1859.

W. B. (Bognor).—About three inches—not less; cost, a few shillings—depending on the maker.

Constant Reader (Rye).—The fault is under-exposure. Give at least double the time, in strong sunshine.

O. O.—Your inquiry is answered by a communication from the author in the present number.

St. Neots.—We cannot undertake to recommend particular dealers or manufacturers.

J. O.—Iodide of silver is soluble in a *strong* solution of iodide of potassium; scarcely soluble in a weak one.

Ambo.—It is unreasonable to expect one lens to answer every purpose. You must limit your lens to what it is expressly constructed for.

Nitrate.—Your bath probably contains too much iodide of silver; add fresh nitrate of silver, and filter.

W. X.—You can see the subjects you name in the Architectural Photographic Society's Exhibition, now open.

F. Palmer.—Your letter has been overlooked.

Puzzled-head.—The deposit is pure silver.

Anthony.—You must not dilute your collodion with alcohol, but with ether.

Carbon.—Your question is answered in the last number of this journal.

L. A.—A half-plate lens will answer your purpose very well.

A. B.—Mr. Maxwell-Lyte's formula is free from the objection you name.

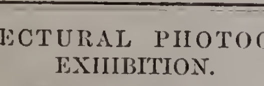
W. W. A.—Iodide of cadmium yields a more stable collodion.

Oxon.—The best way of purifying a salt is by crystallising it once, or oftener.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard.

The "Enfant Prodigue," by Teniers, in the Gallery of the Louvre, is considered one of his finest pictures. We observe great regularity in its arrangement. The vertical lines of the central female figure are balanced by the two sitting figures (as in Wilkie's "Blind Fiddler"), which are

again opposed by the man's arm on one side, and the stick on the other; whilst the stooping page and female on either side furnish similar quantities. The *nearest* objects in the picture (the wine-cooler, &c.) are precisely under the *most distant*, giving space, and taking the eye into the picture—the opposing lines of the outline, *c c*, of the near and more



c c

distant figures; but, though equally correct, and, indeed, somewhat similar in arrangement, the art here is more transparent than in Wilkie's "Blind Fiddler."

(*To be continued.*)

ARCHITECTURAL PHOTOGRAPHIC EXHIBITION.

CONCLUDING NOTICE.

As soon as we turn from the views in France, by native artists, we are forcibly, and somewhat unpleasantly, reminded, that there is an artistic element in photography which is seldom recognised or employed by the photographer. The views in which the whole picture is covered with architectural or sculptural details are, for the most part, satisfactory in an artistic point of view; the chiar-oscuro is harmonious, and an equality of tone throughout prevails. In those views, on the contrary, where a large portion of the picture is occupied with sky, the artistic effect is marred by the blankness of that portion of the subject, which produces a cold, raw, crude effect, very displeasing to the eye, and no less injurious to the picture: such is the result of stopping-out the skies. In some few instances skies have been left, but of a quality so bad—being full of stains, comets, streaks, &c.—that they more than reconcile us to the "stopped-out" skies. In past years, the eye was so gratified with the amount of detail obtained, that the sky was but a secondary consideration; and pictures of the other class—those in which the whole view is occupied with details in chiar-oscuro—were so rare, that the comparison now forced upon us was not felt. This is a defect in the photographic art that ought to be overcome, and we think it not difficult to do so. After the eye has got familiar with the pictures without skies, the others appear quite intolerable. Most of the English views have the defect we mention. Those which have not—as some of the views of the façades of our cathedrals, &c., by Mr. Fenton—immediately attract the eye. We may instance 303, the "West Porch of Lichfield Cathedral," as one of the finest pictures in the room; so is 309, "Part of the West Front of York Cathedral," and 311, "The Galilee Porch of Ely Cathedral." 305, "The Side Entrance of West Front of Lichfield Cathedral," partakes of the same satisfactory qualities of good chiar-oscuro. 288, "Gloucester Cathedral," is spotty, and consequently deficient in harmony. In 290, "Fountain's Abbey," the stonework is of so light a tone, that it lacks solidity. 300, "View on the Terrace, Haddon Hall," is rich and solid looking, only rather black in the shadows. 306, "Tewkesbury Abbey, from the West," is a singular view, the foreground being occupied with grave-stones. 301, "Raglan Castle," is, in some respects, a good picture; but the stonework being too light, it appears deficient in solidity. Most of the series of "Haddon Hall," otherwise excellent, have the defect in the skies we have noticed.

The views by Mr. Melhuish are very meritorious. 318, 319, and 320, "Views of Tintern Abbey," on a large scale, are truly picturesque. 321, "The High Street, Oxford," although the best we have seen of this subject, is deficient in solidity. 323, "St. George's Chapel, Windsor," is mottled in appearance—due, probably, to varied colours in the stones of which the walls are constructed. 326, "Carisbrook Castle," is a good view of a very pleasing subject. Mr. Cocke's view of "St. George's Hall, Liverpool," is good in every respect but the colour; the reddish-brown hue to which this specimen is toned, injures the effect the negative is capable of affording. 359, "Durham Cathedral, from above the Bridge," is a fine view of this noble structure—somewhat too black in the shadows. 361, "South-east View of the same," is a truly noble picture, and 364 possesses many attractions. The other views by this artist do not require to be particularised—they are sufficiently attractive from the nature of the subjects. Next, Messrs. Dolamore

and Bullock's claim attention. 411, "Gate House, Kenilworth," is a good picture. 408, "Cloister Tower, Magdalen College," is a fair specimen, but too light. 414, "West Front of Wells Cathedral," has a confused, muddled aspect, due, probably, to certain peculiarities in the original. There is a series of views, taken expressly for the Association, by Mr. Bedford, which display that artist's peculiar *traits;* among the best of which is 440, "Baptistry, Canterbury Cathedral," and 441, "Precinct Gate" of the same. 459, 461, and 464, views of "Tintern Abbey," possess great excellence. Mr. Dixon Piper's "View of the Abbey Gate," Bury St. Edmund's, 492, is better chosen than 493, the same scene on a larger scale. 498, "Wolsey's Gate," Ipswich, gives an excellent idea of the solid red brick-work of which it is constructed. 498, "View of Sparrow's House," in the Butter Market, Ipswich, is quite a gem for the antiquarian. Mr. Robinson, of Leamington, contributes no less than sixteen views of "Ludlow Castle," which enable us to thoroughly comprehend every feature of that interesting structure.

The Roman States are depicted in thirty views by Mr. Macpherson—far too few, considering the architectural resources of the locality, but all of excellent quality. 123, "The Theatre of Marcellus," at Rome, is one of the finest specimens of chiar-oscuro in the room. It has an air of massiveness that conveys a true idea of the grandeur of the original, while the detail is perfect. The "Forum of Trajan," 124, is peculiarly interesting, from its containing the column of Trajan, with its multitude of bas-reliefs, which, with the aid of a magnifier, may be made out more satisfactorily than from any other mode of representation. This view is well chosen, and the scene is full of the deepest interest. 131, "The Temple of Minerva," at Assisi, and 133, part of the "Upper Church of St. Francisco at Assisi," are worthy of special mention. 127, "Ruins of a Baronial Stronghold," is a fine specimen of the romantic picturesque. The "Views at Perugia" are the least successful of Mr. Macpherson's contributions. 149, a "View of Rome," from the Latin Gate, will well repay examination. St. Peter's rises in the extreme distance, and we are enabled to obtain a correct idea of its magnitude. Northern Italy is liberally represented in the works of Signor Ponti. They are of very unequal merit; some are all that could be desired, others are sadly marred by vicious manipulation. Among the best, we may instance 152, "Church of the Madonna della Pieta," at Brescia; and 153, details of the "Hospital at Milan." 155, "Entrance to the Cathedral," at Monza, is a fine specimen of good chiar-oscuro. 154, "The Bronze Doors of St. Zeno," Verona, are full of exquisite detail. The "Views in Venice" form the largest proportion of Signor Ponti's subjects: they are of various degrees of excellence, but all interesting from the accuracy with which they place before us the peculiarities of the Venetian architects. Many of the views are spoiled by the skies being "stopped out." "St. Mark's Cathedral" is copiously illustrated: we have views of nearly all of the celebrated palaces, among which we may particularise 225 and 226, 230 and 231, and especially 237, the "Ducal Palace, Porta della Carta." 205, "The Lion at the Entrance to the Arsenal," is a grand piece of sculpture, finely photographed. Many of the photographs consist of details of windows, doors, &c., which are very interesting and valuable to the architectural student. Among them there are the celebrated windows at the "Bridge del Fornaro," and those from the "Palace of San Benetto," charming in every respect.

The "Views in Spain," by Mr. Clifford, are most interesting in point of subjects. As photographs, those on the walls of the Exhibition are not all satisfactory in respect to colour or condition; their yellowness betokens incipient decay.

It now only remains to notice the views in Constantinople and Jerusalem, by Messrs. Robertson and Beato, among which, 87, "Fountain of Sultan Mahmoud," and 91, "New Mosque, Orta Kenz," and 92, "Mosque of the Conqueror;" 94 and 95, "The Great Gate and Porch" of ditto, deserve special notice. They are full of "local colouring," and possess much interest to the student as illustrations of variety in national styles.

The views in Jerusalem claim a large share of interest from the localities represented. We may particularise 97, "The Village of Bethany;" 99, "General View of Jerusalem;" 100, "Mosque of El Aksa;" 105, "The Mosque of Omar;" 111, "Church of the Holy Sepulchre," in which the sky is left in the negative, but the effect is bad. 112, "Porch of the same;" 115, "Wailing Place of the Jews;" 116, "General View from Mount Scopas;" and 118, "Part of the Walls and Garden of Gethsemane," which are all of great interest as well as excellence.

Scarcely a picture in this Exhibition but what possesess a local interest, apart from its value as an architectural illustration. Our remarks upon these works are influenced by three different considerations:—First, there is the intrinsic interest in the subject itself, which in many instances reconciles us to the deficiencies of skill and tact in the artist who has undertaken to depict it; next, there is the consideration of manipulative skill in the exercise of the photographic art; and lastly, there is the artistic treatment. The artistic qualities and manipulative skill are found pre-eminently combined in the works of Baldus, Bisson, and Roger Fenton, who is the only rival to the French artists. The works of Signor Ponti exhibit an appreciative knowledge of the requirements these works demand as architectural illustrations; but, in most of their productions, the English photographers appear to have aimed chiefly at the picturesque. To render architectural photographs valuable as studies to the architect, the picturesque must frequently give way to the exhibition of form and detail. It is necessary for the photographer to know what the architect requires in representations of edifices. It is but too evident, that the majority of the photographers whose works are exhibited are entirely ignorant of what the architect requires; and if their productions find favour, it is in spite of the artist. Photography appears to have come very opportunely to aid the earnest study of Architecture that has sprung up within the last few years. Architectural draughtsmen were becoming exceedingly scarce, and architectural painters still more so. Fortunately, in photography we possess a resource that far outvies in accuracy and minutiæ the utmost mastery of human eye and hand. A photograph of an edifice is a trustworthy document, which must be accepted unhesitatingly by every one. Such is not the case with the majority of engravings extant of similar buildings. Photographs must be true, both in light and shade as well as in detail; no falsifying artistic effects can be put in; we must have the whole truth and nothing but the truth, both in perspective and in chiar-oscuro. The value of these elements of truth in representation cannot be over-estimated in works of this class. In proportion as the photographer aspires to the rank of artist, so will the now almost superseded architectural draughtsman retire from the field of action. But the photographer cannot arrive at this distinction without study; he must master the principles of chiar-oscuro, and he must make himself acquainted with the essential principles of architecture.

FURTHER RESEARCHES IN LIGHT.

BY M. NIEPCE DE SAINT VICTOR.

ON THE ACTION THAT ELECTRICITY, EITHER ALONE OR COMBINED WITH LIGHT, EXERCISES WHEN IT RENDERS SUBSTANCES IN THE STATE OF AQUEOUS SOLUTION CAPABLE OF REDUCING THE SALTS OF GOLD AND SILVER.*

The chemical and electrical actions about to be described have, perhaps, nothing in them very extraordinary; but they have led me to the observation of new facts which may possess some interest.

* Memoir presented to the Academy of Sciences at the sitting of 27th February, 1860.

If into a cold solution of nitrate of uranium we put some zinc or copper turnings, or, preferably, the elements of a simple galvanic pile composed of a plate of copper and another of zinc, the yellow salt of uranium changes to a green salt, in greater or lesser quantity, according to the degree of acidity of the solution. According to M. Peligot, the green salts of uranium reduce the salts of gold and silver, which is the reason why the solution I am about to describe, as well as those which have been submitted under certain conditions to the action of light, reduce the salts of gold and silver, as M. Barreswil has recently shown.

A cold solution of citric or tartaric acid, in which the copper and zinc elements are placed during a given time, also reduces the salts of gold.

If we plunge into red wine the platina-conducting wires of an electric pile, during a longer or shorter period of time, according to the strength of the current, the wine changes in colour, becomes more alcoholic, and acquires an empyreumatic taste, especially if sparks are eliminated in the wine.

Very sugary white wine, into which an electric current is passed, loses all its sugar; it no longer reduces the "Barreswil liquor," and it becomes much more alcoholic —a result the reverse of that produced by the action of light.

But an equally remarkable fact is, that all the solutions named very quickly lose the property of reducing the salts of gold and silver by agitation, or by a prolonged repose in the open air (the green salt becomes yellow again). They retain this property if the liquor fills the vessel, which is hermetically sealed, as occurred under the influence of light with the solutions of nitrate of uranium.

We next observe the effects of electricity and light combined. If we expose to light a slightly acid solution of nitrate of uranium, in which the elements of a simple pile are placed, the liquor becomes troubled, and a violet precipitate is formed, which, according to the examination of M. Peligot, is mixed with sub-nitrate of uranium. The liquor reduces very energetically the salts of gold and silver. This violet precipitate, which is formed only under the influence of light and electricity combined, resembles in its colour and properties the colouration produced by the action of light upon a sheet of paper impregnated with nitrate of uranium, which paper loses its colour in the dark, after the lapse of a certain time.

This violet precipitate becomes green with potassa, and resumes its original colour with an acid, which eventually dissolves it. The following is another example of the action of electricity combined with the action of light: if we place the elements of a galvanic pile in a solution of oxalic acid and nitrate of uranium, or of the yellow oxide of uranium of commerce (uranate of ammonia), a disengagement of electricity in the dark will naturally take place; but if the apparatus be exposed to the sunlight in a white glass vessel, bubbles of gas (oxide of carbon) will be liberated, and cause an ebullition, especially if slightly agitated. In this state, the force of the electric current is greatly augmented, as M. Pouillet has proved by the galvanometer. If the oxalic acid is in excess, as it must be for the pile to act long, oxalate of zinc is formed at the bottom of the vessel.

The action of the pile is not necessary for the solution of oxalate of uranium to produce a disengagement of oxide of carbon, under the influence of light; but electricity increases the action of light, as light augments that of electricity.

Neither electricity alone, nor heat (at least, if the latter be not above 212° Fahr.) can produce a disengagement of oxide of carbon in the solution of oxalate of uranium.

According to my experiments, light changes the nature of oxalic acid in the same manner that it renders absolute alcohol very sugary, and reduces its strength several degrees; while, under certain conditions, electricity transforms sugar into alcohol.

THE PHOTOMETER.

A simple and accurate Photometer would be a great boon to the photographer. At present, the most uncertain part of his operations is the exposure of the sensitive plate in the camera. As no means of measuring the amount of chemical action present in the sun's rays is at command, the time of exposure is necessarily a matter of guess-work. Several methods of measuring the quantity of light have been proposed, but none that are practically available in photography; for the light, during the very short time required to obtain a proof, may be very variable, and the photographer, with photometer in hand, requires to be able to appreciate these variations with the same certainty as he can the progress of time by a watch. In the absence of the requisite instrument, he has to be guided solely by experience and careful observation.

Dr. John Draper, of New York, has proposed a photometer which is based upon the following reactions:—If a solution of peroxalate of iron be exposed to light, carbonic acid is disengaged, and a precipitate of *protoxalate* is formed, which troubles the liquid, and stops the reaction; but if a small quantity of perchloride of iron be added, the liquid remains clear, and may be exposed to light for a long time without becoming troubled. It suffices to add, after the insolation, a solution of perchloride of gold to the solarised liquid, when the gold is immediately precipitated in the metallic state in a quantity more or less considerable, according to the quantity of light present. The gold is collected on a filter, washed, calcined, and weighed, and, by the comparison afforded by a series of experiments, the useful effect of a light during a given space of time may be deduced.

It may readily be seen that this process is not available for the photographer: it might, however, be found useful in measuring the varying intensity of light during a solar eclipse.

M. Nièpce de St. Victor employs a saturated solution of oxalic acid, which he mixes with a solution of nitrate of uranium; no reaction takes place in the dark; but, under the influence of diffused light, decomposition is set up with a disengagement of gas. This decomposition is produced in a small flask closed by a cork, through which a straight tube, open at each end, is passed, and plunged to the bottom of the liquid. The gas, by pressure, causes the liquid to ascend in the tube to a height proportionate to the quantity of light that has fallen upon the flask, and it is sufficient for the tube to be graduated for a comparison as to the quantity of light to be established. This portable apparatus is the nearest approach yet made to a photographic photometer. It is necessary to observe that the gas arising from the oxidation of the oxalic acid cannot be oxide of carbon, but carbonic acid; now, as this gas is more or less soluble in water, according to the temperature and pressure, it is to be feared that the measurement of its volume will give erroneous conclusions.

The principle of the photometer, described by Professor Roscoe (page 324), is the most philosophical that has yet been submitted to our notice, but, in its present form, it is quite unavailable for photography. Perhaps, if carbonic oxide were substituted for the hydrogen, a more manageable compound than hydrochloric acid gas would be obtained. Chloroxy-carbonic gas decomposes slowly in diffused light, and immediately in sunlight.

WET AND DRY COLLODION.*

BY M. L'ABBE DESPRATS.

By following the methods we have previously indicated for the preparation of collodion, the photographer can easily obtain for himself a product, upon the quality of which he may rely, for some time, at least; for, as we have said, if a collodion does not acquire all its qualities until time has effected chemical reactions, it is also true that, this period

* Continued from vol. ii. p. 51.

once arrived at, these reactions, favourable thus far, become injurious if further prolonged. This inevitable alteration is independent of all formulæ. We are aware that there are many collodions for which the title of unchangeable is claimed, but we are certain that the most vaunted collodions are, in this respect, like all others, subject to a fearful instability.

The most apparent characteristic of this spontaneous change consists in a diminution of sensibility. Feeble during the first few weeks, it eventually becomes more decided, so that, with certain old preparations, the production of a portrait becomes nearly impossible. The loss of sensibility, moreover, is not always the most serious inconvenience time effects upon collodion; another, still more important, consists in a loss of tenacity in the film. Indeed, it is but too true that every collodion finally loses much of its tenacity; thus, in certain samples, the molecular aggregation becomes so feeble that the film breaks up in every direction, and leaves the glass even before the plate has passed through the bath. This change, it is true, does not take place to the same extent in every sample, but there is scarcely one that does not change sooner or later.

A collodion, excellent at first, will continue to give unexceptionable pictures, so long as the film is in the wet state, but, as soon as it dries, the film will appear full of holes, and mottled all over. Do we know of any remedy for this state of things?

We have remarked from the first, that almost every collodion assumes, in the course of time, an amber tint, which becomes deeper and deeper, even if kept in perfect darkness. This coloration proceeds, it is supposed, from a certain quantity of iodine being set free. Therefore it is recommended to neutralise this free iodine, either with a few drops of ammonia, or by the immersion of a piece of zinc. This expedient, it is true, weakens the amber tint of the collodion, but still very imperfectly, and never restores the original olive-oil colour it possesses upon its first preparation. The loss of sensibility may vary greatly in different samples, even when prepared according to the same formulæ, and with the same intelligent care; but the truth must be told, that after a lapse of time, more or less considerable, the sensibility will almost entirely disappear, and we know of no means of restoring it. It is in vain to seek to utilise such a collodion by prolonging the exposure: most frequently, upon development, a very weak, indefinite, stained picture is all that appears on the plate. A collodion, so completely changed by time, seems to have lost a portion of its iodide. It is, perhaps, not impossible that the iodine, disengaging itself, little by little, from its original combination, forms a new one, which gives rise, in the nitrate bath, to a less photogenic compound than iodide of silver. Whatever it be, this is certain, that by adding to such collodion a few drops of iodised alcohol, it becomes capable of again giving vigorous proofs, at least for a time.

As to very old collodion, which breaks up under the action of the bath, we can also restore some tenacity to the film by dissolving a certain quantity of pyroxyline in the collodion. We do not think it necessary to employ, for that purpose, a thick pharmaceutical collodion, at least when it is not newly prepared; for a collodion of this description, although containing no iodine, also undergoes a change in time; it becomes much less viscid.

There is, then, to consider the holes and marbling which appear in a very old collodion. We have before stated, that this very serious inconvenience shows itself but too often in a collodion prepared with alcohol and ether insufficiently rectified, even immediately it is prepared. If the rectification is properly conducted, the spots, marbling, &c., are much later in making their appearance; probably, not till the end of several months, but they will finally show themselves, in case the ether and alcohol are nearly absolute. It is only a question of time; but it may be stated as a general fact, for up to the present day we have not had a single sample free from this defect. Who, then, would have the boldness to say that this continuous reaction of the constituent principles of collodion results at length in the formation of a little water? Wishing to ascertain in how far this presumption was well founded, we had the idea of submitting a collodion, that gave a proof full of holes, to the action of a feeble electric current, such as is given by a platina wire put in contact with a small plate of zinc.

This galvanic element being immersed in the collodion, with the view of decomposing the water that might have formed, a feeble current was immediately produced, capable of deflecting the astatic needles of Melloni's multiplier four or five degrees. A very palpable deposit upon the two conductors proved that a real decomposition was going on. If a disengagement of hydrogen took place, it was so slowly as not to be very perceptible; besides, this gas might have combined with some other principle. After twenty-four hours of electric action, we attempted to take a picture; the collodion thus treated was curiously modified; it no longer gave a film with holes, but the proof developed itself very irregularly; the blacks were very intense, but only in portions of the film, and the half tones were nearly everywhere deficient. It is very probable that in this case the decomposing force of the electricity acted indifferently upon all the constituent principles of the collodion. It is possible to make a better use of this power by moderating it, but we frankly admit that we have not the courage; for these experiments do not justify us in believing that any collodion which, by age, has lost its original qualities, can ever recover them; and, consequently, must be pitilessly rejected.

(*To be continued.*)

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. S. BOURNE.

Having, therefore, considered the more prominent qualifications a photograph should possess, I must hasten to the remaining and more practical part of my subject, viz., the materials required. I have thought the best way of dealing with this part of the subject would be to deviate slightly from the apparent course, and instead of treating abstractly of the different chemicals required, and describing the various forms of apparatus which the photographer has to use, to take a more practical course, and confine myself to one special department and process, going briefly through its different operations, noticing, as I pass along, the apparatus required, and the kind which, according to my judgment, is best adapted to it. This course I thought would be more useful to those, if there should be any present, who were thinking of devoting some of their leisure time during the coming summer to the sensible, pleasant, and rational enjoyment which photography affords.

What I have to say, then, will have special reference to *landscape* photography by the "Fothergill dry process." Portrait photography is the especial department of *professionals*, and, by describing what is necessary for a *dry* process, I not only encompass all that is required for the *wet*, but something more; and I have selected the "Fothergill process," not only because I am more familiar with it, but because, in the hands of amateurs generally, it gives results quite equal to any other process, with manipulation less complex than most of them require.

In selecting a camera and lens, considerable judgment is required, as, if these are of inferior quality, imperfect in construction, or not adapted to our purpose, the difficulties we shall have to encounter in our progress will be considerably increased. In a camera the chief points to be considered, next to accuracy of construction (for which we must rely on the reputation of some well-known house), are durability and portability. Though many excellent cameras are now in the market, there are none, to my knowledge, which better fulfil

* Continued from vol. iii. p. 309.

these conditions than the sliding and folding cameras manufactured by Ottewill and Co., of Islington. The prices are rather high, but the workmanship is excellent in every particular. As regards the size, every amateur of course will be guided by his pocket, and the opportunities and facilities he possesses for *practising* the art. Many confine themselves to taking stereographs; but those who aim at larger, if not greater things, will find from 8 × 6 to 12 × 10 inches, useful sizes. If the latter size is exceeded, the photographer must expect a large increase of cost, both in the original purchase of apparatus and in the after working, as well as increased difficulties in manipulation.

But, if an amateur is equal to these, I would say by all means take pictures as large as you can, for I can well imagine no photographer would grudge either trouble or expense when he develops a picture, perfect and beautiful, of some noble Gothic cathedral, or lovely landscape, of dimensions similar to some we see hanging in these rooms. Imagine the pleasure Mr. Fenton must have experienced when he developed those noble pictures of his which have rendered his name so famous, and placed him foremost in the art.

In choosing a lens, the beginner will be puzzled by the many different kinds, each purporting to be the best, now advertised in the journals. The manufacture of lenses for photographic purposes has lately received such attention from our leading opticians, and, in consequence, so many excellent ones have been brought out, that it becomes a matter of considerable difficulty to determine which maker's are the best. I don't think the purchaser can be very far wrong in any of them, providing he obtains that specially adapted for the particular purpose for which he requires it. But, as it is unreasonable to expect one kind of lens to answer equally well for all purposes, the photographer should provide himself with at least two—I do not mean one for portraits and one for landscapes, as I am not now dealing with portraits—but one for general landscape work, and one for architecture. That adapted for the latter should embrace a large angle of view, and give straight marginal lines, such as the new "periscopic" lens of Goddard, or the "orthoscopic" of Ross or Petzval. For general landscape work, I think none surpasses the old single achromatic form. When *two* are used, it is a great convenience to have them mounted so that both will fit the same screw, as we can then adapt either indiscriminately, without moving the front of the camera. In taking stereoscopic views, also, two cameras should be provided, or one camera which admits of either one or a pair of lenses being used, as the subject may require.

It may be as well to remark here, that, when an amateur resolves to try a certain process, he should pursue a firm and steadfast course, and stick to it until he has thoroughly mastered it, and not be continually changing—trying every new process or modification which the restless brain of some photographers are constantly putting forth. Those who are always changing their process and their collodion seldom succeed, because, before they have given one a fair trial, they are off to something else. When a photographer has thoroughly mastered any one of them, and can produce good results thereby, then, if he thinks it complex, or it fails to satisfy him, he may try another which appears more simple, and offers superior advantages. I have already stated that, in my estimation, founded on a practical acquaintance with several of the leading dry processes, there are none so simple and none more certain than the "Fothergill," which I will now briefly describe, according to the method I have adopted myself.

(*To be continued.*)

ALUMINIUM.—NEW MODE OF PREPARATION.

This metal daily increases in importance. Its application to photographic apparatus, especially to the construction of metal cameras, invests it with an interest which causes us to look with avidity for any new mode of obtaining it that promises a reduction in its cost. From its extreme levity, it would appear well calculated to supersede brass for mountings of lenses. A process suggested by M. Corbelli consists in first washing the clay, to separate it from stones, leaves, and other foreign matters. A given portion of this clay—say, 10 ounces—is dried, and submitted to the action of its weight of sulphuric, nitric, or hydrochloric acid, to separate the iron with which it is mixed.

After complete solution the earthy matters are allowed to deposit, and the clear liquid is decanted. The residue is then dried, and submitted to a heat of 900° Fahr.; it is then mixed with twice its weight—20 ounces—of yellow prussiate of potash, well dried and pulverised. The quantity of this latter substance may be increased or diminished according to the proportion of silica the clay contains; then 15 ounces of marine salt are added to the mixture, and the whole put into a crucible, and heated until the white colour disappears. When allowed to cool, the aluminium will be found at the bottom of the crucible.

From experiments, which appear reliable, upon the traction of pure aluminium, cast or hammered, and with an alloy consisting of copper, 90, and aluminium, 10 parts, also cast or hammered, M. A. Bury draws the following conclusions:—The resistance of the pure aluminium is equal to 11 kilogrammes per square millimètre, and holds a place between cast zinc and copper. The resistance of hammered aluminium, of about 28 kilogrammes, is comprised between that of cast and hammered copper. The resistance of the alloy or bronze of aluminium is comprised between that of iron and steel for the cast alloy, equal to that of steel for the hammered alloy; while that of ordinary gun metal is only half that of steel.

PHOTOZINCOGRAPHY.

At the Royal Society's *soirée* held last Saturday evening, among other objects of interest which engaged the attention of the company were some specimens of photozincography, the productions of Colonel Henry James, Director of the Ordnance Survey. A specimen before us—a *facsimile* of an ancient manuscript on parchment in the Record Office—taken on parchment-paper, is as clear and perfect as can be desired, and furnishes very satisfactory testimony of the perfection of the process by which it has been obtained. Through the kindness of Colonel James, we hope soon to be able to place the details of the process of photozincography before our readers.

ON THE MEASUREMENT OF THE CHEMICAL ACTION OF LIGHT.

On Friday evening, the 2nd instant, a lecture of great interest to photographers was given at the Royal Institution, by Professor H. E. Roscoe. The subject was "The Chemical Action of the Solar Rays," and on the measurement of the chemical intensity of light by a newly-invented Photometer. The lecturer commenced by observing that it was almost superfluous to insist on the importance of the sun's influence in sustaining animal and vegetable life on the globe, for the evidence of its power, as to the physical relations of the earth, was quite overwhelming. Yet it is necessary to consider the subject, in order to form a just idea of the magnitude of the sun's action upon the earth. We must not limit our view to animals and plants restored by light and heat. Each drop of water, every breath of wind, owe their existence to the same cause. We must see that, by the study of geology, not only in coal-fields, but in the sedimentary crust deposited on the surface of our planet, evidences of the enormous power the sun has, during his epochs, expended on the earth.

Those portions of the solar rays which vibrate slowly at the red end of the spectrum, are those which produce the alterations of temperature on the globe. These are the *heating* rays, to which we owe all those motions in the atmosphere which constitute winds, and those enormous distillations which form rains. The amount and distribution of these heating rays at any one point on the earth's surface determine the thermal

climate of that place. On the other hand, those of the sun's rays which vibrate most rapidly and are situated at the violet end of the spectrum, are called the *chemical* rays, because it is by these rays that the chemical actiou of the sun's light is produced; and it is by the presence of these rays alone that the plant is enabled to decompose the carbonic acid of the air and assimilate the carbon, and subsequently communicate it to animals. The character of the flora of any place depends mainly, or to a very great extent, upon the amount and distribution of the chemical rays which fall upon it—determine, in fact, what is called the *chemical climate* of that place. The measurement of the quantity of solar radiation which falls upon the earth must, as may be readily understood, be a very important matter; in fact, it is material for determining the physical history of our globe. Fortunately, we possess a method—imperfect, it is true—of measuring the effect produced by the heating rays. Temperature is measured by the thermometer; and, by a continued series of observations at differeut points on the earth's surface, science was gradually accumulating a mass of evidence and valuable information which would ultimately enable us to determine the laws which regulate the distributiou of heat and cold over the globe. For the chemical portion of the solar rays, no means of measurement that can be depended upon have yet been discovered. Meteorologists are engaged upon this important subject; but the difficulties that appear to surround the actual measurement of the chemical rays have not yet been wholly surmounted. The chemical influence of light is shown by its action upon chloride of silver, which blackens when exposed to light, and is not only changed in appearance, but in its chemical nature, also, the chloride is decomposed. If, in summer time, we take some fresh leaves, and place them in carbonic acid gas, exposed to the light, carbon is absorbed, and oxygen eliminated. When the two gases, hydrogen and chlorine, are mixed together in equal proportions, they form hydrochloric acid, but only under certain circumstances; the presence of light is necessary, for in the dark they do not combine at all. (This was illustrated by experiments.) If a mixture of hydrogen and chlorine be brought iuto the presence of sunlight, the combination is effected so suddenly, and with such force, that an actual explosion takes place. The same result ensues in presence of the lime and the electric lights. In a weak, diffused light, this combinatiou of the gases takes place more slowly, and may be placed under complete control. Availing ourselves of this slow combination, we are enabled to contrive an instrument that shall measure the quantity of chemical rays present, in the same mauner as the thermometer measures the heating rays. It is only necessary to make sure that the mode of measurement is real—that the chemical photometer should actually represent the amount of chemical rays emanating from any given source. The photometer exhibited by Professor Roscoe consists of three parts:—First, the part where the hydrogen and chlorine gases are eliminated by the decompositiou of hydrochloric acid by the electric current; the second portion consists of the vessel in which the combination of the gases takes place; the third, that in which the measurement is made. To get the instrument into working order, it is necessary for the gases to be conducted through the smaller parts of the apparatus for more than a week prior to usiug it. When the apparatus is duly charged with the mixed gases, by the aid of a reflector, a weak, diffused light, is brought to bear upon the mixture, and combination immediately takes place. The measurement tube is in connection with a small column of water, which flows into the tube in proportion as the gases are decomposed by the light. The tube being graduated, the progress of the column of water is read off from moment to moment; and the rate at which it moves in a given time is the index of the intensity of the chemical action, because the quantity of hydrochloric acid formed is exactly in proportion to the amount of light that falls upon the mixture of gases. To graduate the scale of this photometer, it is necessary to proceed in a manner aualogous to that employed for graduating the scales of thermometers. Take a definite amount of light, and observe how much action that amount of light produces on the scale of the instrument; a flame of pure carbonic oxide, burned at a given rate from a regulated aperture, and placed at a certain distance, produces a certain result; and, whatever it be, the instrument marks that result on the scale, whether it be one foot, or ten feet, or ten divisions. There is a certain amount which is taken as the standard unit of light, based on the chemical action produced by a flame of carbonic oxide upon the sensitive mixture of chlorine and hydrogen, during the space of one minute, at a distance of one mètre; and the quantity of light produciug this action is taken as the chemical *unit* of light—a thousand of such units one chemical *degree* of light. The chemical photometer is graduated by observing how many of these chemical units of light corresponded to one division on the scale of the instrument.

The possession of a constant source of light is the first essential for the measurement of photo-chemical action. To illustrate the mode in which the chemical action of light is employed, it is necessary to describe how the chemical action of the direct solar rays is determined. For this purpose, it would of course be necessary to allow only a very small portion, but still a known portion, of the solar rays to fall upon the instrument. Indeed, if only a tolerably small portion of sunlight is allowed to fall upon it, the action is so intense that the instrument would be shattered to pieces. But by allowing only a very small portion of the rays to fall upon a small hole in a metal plate, placed in a window-shutter of a darkened room, and reflected by a beautiful instrument called the heliostat, the rays are made to fall upon the instrument, and the result is, a gradual combination of the hydrogen and chlorine, resulting in the formation of hydrochloric acid. On the 15th September, 1858, a number of observations were made with this instrument on the chemical action of the direct sun's rays. The sky was perfectly cloudless, and the sun's rays were affected only by their passage through the atmosphere. The observations began at nine minutes past seven in the morning, when the sun's zenith distance was 76·30. The amount of actiou observed in one minute was 1·52, that being the quantity of sunlight that fell upon the instrument. From the observations made every few minutes, that amount continued to increase rapidly; and at twenty-six minutes past seven the action was found to amount to 4·22, and at forty minutes past, to 6·69. At fourteen minutes past nine, the last observation on that morning was made, on account of clouds appearing in the horizon: the amount of actiou then observed was 18·51—thirteen times more than at nine minutes past seven; the sun's zenith distance being less, while the height of the sun above the horizon was greater. What was the cause of the iucrease in the chemical action of the solar light? It is to be entirely ascribed to the fact that the solar light, in passing through the atmosphere, is, to a certain extent, absorbed, lost, or extinguished. Therefore, the thicker or the longer the column of air be through which the light has to pass, the greater is the absorption or loss of light. It is well known that the shadows of objects cast by the sun in the morning are not so intense as those seen at noon, nor are the shadows cast at evening. If the laws which regulate the absorption of the sun's rays by the atmosphere were known, the result of any atmosphere could be calculated: it is found that about two-thirds of the direct sun's rays aro lost in passing through the atmosphere. If the sun's rays were not weakened by passing through the atmosphere, they would produce an illumination of 318 degrees of light: they would effect in one minute a combination equal to a column of hydrochloric acid of 35·3 mètres in height, the sun's rays having passed perpendicularly through the atmosphere. Supposing the atmosphere to be made up of chlorine and hydrogeu, how much of that atmosphere would be combined to form hydrochloric acid, by the sun's direct rays falling upon it? It was found to be 35 mètres; but so much was absorbed, that only 14 mètres would be combined, so that two-thirds of the chemical action were lost in passing through the atmosphere. We can calculate the amount of chemical action which the sun's direct rays produce at any place, when we know the latitude and the thickness of the atmosphere through which the sun's rays pass. The chemical action of the direct suu's rays increases as we approach the equatorial regions, and the difference in the amount of the chemical action at the bottom and the top of a mountain could be calculated. [By a series of beautiful experiments, the lecturer proceeded to show the effect of various coloured lights upon the mixture of hydrogen and chlorine.] In conclusion, he observed that no doubt could exist of the immense importance of a regular series of measurements for tracing out the amount of the chemical rays at various stations on the earth's surface. Such a series of observations would open up an entirely new field to the science of Meteorology. The mode of measurement he had exhibited

could not, however, be generally adopted, although it afforded the first and an important step towards realising that end. It is far too complicated for daily use, and necessitated a knowledge of the primary laws of the chemical action of light, and the distribution of the chemical rays. The instrument required special treatment—a few minutes' inattention might spoil the work of days; and, in order to secure a correct observation in the morning, the instrument had to be continually watched during the previous night. He hoped that in the course of time an instrument would be made that could be depended upon—one that would save much of the time and labour now spent in meteorological observations.

Dictionary of Photography.

LITHO-PHOTOGRAPHY.—The art of producing photographic designs upon stone, from which impressions may be printed in ink by the ordinary printing process. To obtain an image on the stone, presenting the same qualities as lithographic drawing, a substance is required which combines the following conditions:—It must form a uniform, even layer upon the stone. It must be sensitive to light, so that a subsequent washing may expose all the whites, and preserve the half-tones of the design. It must adhere to the stone sufficiently to protect it from the action of the mordant, and it must present a surface capable of receiving ordinary lithographic ink. Bitumen is a substance that fulfils all these conditions. It was first employed, for this purpose, by M. Nicéphore Nièpce, and proofs of remarkable vigour and great delicacy have been obtained by operating in the following manner:—

Bitumen is dissolved in ether in such proportion as only experience can dictate; a thin coating of this solution is spread upon the prepared surface of a lithographic stone; it must not be so thick as to form a varnish, but what engravers call a *grain;* when examined by a powerful magnifier, the surface of the stone should exhibit cracks all over its surface, the fissures of which are the naked stone. The fineness of this grain will depend greatly upon the dryness of the stone, upon the strength of the solution of bitumen, and upon a temperature sufficiently elevated to produce a rapid evaporation.

When the coating is perfectly dry, a photographic negative is applied to it, and exposed to a strong light for a length of time, which experience alone can determine. When the exposure is considered sufficient, the negative is removed, and the surface of the stone washed with ether; wherever the light has passed through the negative, the bitumen becomes insoluble, and remains upon the stone while being washed, while on those parts protected by the dark of the negative, it is dissolved.

If the time of exposure has been too short, the image on the stone will be too light, and exhibit no half tones; if, on the other hand, it has been too prolonged, the image is heavy, and all delicacy is lost. The washing by the ether must be made freely, otherwise spots will form which cannot be removed.

The proof, if successful, is dried, and then undergoes the same preparations as a drawing upon stone: it is first acidulated with a diluted acid; coated with a solution of gum arabic, to clear the lights, and impart more transparency to the design; washed freely in water, then with spirits of turpentine; and, lastly, inked with ordinary lithographic ink. If the operations have been well conducted, the bitumen will take the ink immediately it passes under the roller, and yield a design with a good grain, without the necessity for the slightest retouching. It can then be printed from in the ordinary manner, and, with care, will furnish as many good impressions.

M. Poitevin's method of litho-photography consists in employing a mixture of bichromate of potassa and albumen, with which the ordinary lithographic stone is covered. The photographic negative is placed upon the surface when dry, and exposed to the light. The albumen, modified by the action of light in contact with the bichromate of potassa, becomes insoluble; that which has not been submitted to its action remains soluble, and is removed by washing the surface of the stone with water. A roller charged with transfer ink is then passed over the design; the ink adheres to those parts covered with albumen; the other portions remain intact. The stone is then submitted to the usual preparations in obtaining lithographic designs, and impressions are taken in the usual manner.

M. Asser has recently proposed the following method of photo-lithography:—A piece of unsized paper is imbued with starch, then floated on a concentrated solution of bichromate of potassa. When dry it is placed on a negative in the printing frame, and exposed to the light. The proof is then heated on a marble slab, and pressed; afterwards moistened. An inking roller is then passed over it; the image soon begins to appear, and is strengthened by each succeeding application of the roller. It is next floated in water acidulated with a few drops of nitric acid. If lithographic ink has been employed, the design can be at once transferred to stone or zinc; in which case, the washing in acidulated water must be omitted.

(To be continued.)

Correspondence.

FOREIGN SCIENCE.

(From our Special Correspondent.)

Paris, 5th March, 1860.

M. NIEPCE DE ST. VICTOR presented to the Academy of Sciences, at its last meeting, a new memoir on the action of electricity alone, or electricity and light combined, upon certain substances in solution, by which actions these substances acquire the property of reducing salts of silver and gold. It is stated in this memoir that if zinc and copper, or one element, zinc-copper, of a battery, be placed in a cold solution of nitrate of uranium, this yellow salt soon becomes green, and, being then in an inferior state of oxidation, reduces salts of silver and gold. This is nothing new. But M. Nièpce shows also that when copper and zinc are placed in tartaric or citric acids, the latter acquire the property of reducing chloride of gold without the application of heat. This is natural enough, and is certainly capable of easy explanation; but none is given in the memoir. To proceed: if the platinum conductors of a battery remain for some time plunged into red wine, the colour of the wine is seen to change, the quantity of alcohol augments, and an empyreumatic taste is developed in the liquid; especially if electric sparks have been passed through the wine. I do not exactly see how the quantity of alcohol can augment in this experiment. I wish it may be true, as it would, probably, be a new source of obtaining alcohol for laboratory purposes, and on a cheaper scale in England, if it be true that you are about to receive all our French wines duty free!

Some very sweet white wine, through which M. Nièpce passed an electric current for some time, lost all its sugar and became richer in alcohol. Is it, then, possible that electricity can change sugar into alcohol? If true, this is a most astounding discovery. But M. Nièpce tells us at the same time, that when a solution of sugar is electrified for as long a time as the white wine just alluded to, the quantity of sugar does *not* diminish according to the saccharometer. How can we reconcile these facts?

Now, let us see what takes place when light is allowed to act at the same time as the electric current. When a solution of nitrate of uranium is submitted to this double action (the electric current being derived from one element only, *i.e.*, one small plate zinc-copper), the liquid soon becomes turbid, and a violet coloured precipitate (in which some sub-nitrate of uranium is found) is thrown down. The liquid easily reduces salts of silver and gold. Again, if a

solution of nitrate of uranium and oxalic acid be made, and a single element, zinc-copper, placed in the liquid, an electric current is observed even in the dark; but if the apparatus is exposed to daylight, the liquid appears almost to boil, especially on being shaken, much electricity is produced, and a gas is evolved, which M. Nièpce says is oxide of carbon, whilst oxalate of zinc is formed at the bottom of the flask.

M. Toussaint, of Rouen, has just sent to the Academy a paper that will excite the curiosity of many of your readers, and it is really unpardonable that the *Comptes Rendus* of the Academy, which seems to become poorer every week, only gives the *title* of the paper in question. Happily for us, there are other sources of information besides the Academy. M. Toussaint has been repeating the experiments of M. Edmond Becquerel and M. Nièpce de St. Victor, in which coloured objects were produced with all their natural tints upon daguerreotype plates. M. Becquerel photographed, as you are aware, the solar spectrum with all its colours. My friend, M. Nièpce, upon whom I have been, perhaps, rather severe to-day, preferred a doll for his experiments: this doll was dressed in the brightest colours, and, at a distance, might have been mistaken for a solar spectrum or a small rainbow. All the colours were produced many times on the silver plate, but were never fixed. M. Toussaint, whose name is new to me, has, it appears, tried a variety of experiments, but I have not yet been able to get any detail of them. The principal agents with which he has succeeded in producing and fixing these coloured images are, "*l'huile essentielle d'œillet* (essential oil of pink) and chloride of gold."

At a recent meeting of the Academy of Sciences, a paper by Dr. Phipson, on some new cases of phosphorescence, was read. The author shows that native sulphuret of antimony, or stibine, glows with a phosphoric light when it is heated in a crucible to a dark-red heat. When copper, silver, or gold are melted before the blowpipe in a piece of charcoal, they also become phosphorescent at this high temperature; copper, in this case, is seen to shine like the glow-worm, with a greenish yellow light; the effect is striking when the phosphorescence is viewed through a piece of blue glass. The mineral lepidolite, which was not known to possess such a property, is, according to our author, very phosphorescent before the blow-pipe, especially when viewed through the blue glass. Dr. Phipson has discovered, also, that sugar of milk or lactine becomes phosphorescent on being broken or ground down in a mortar—a fact not devoid of interest, as it brings sugar of milk still nearer to other sugars, such as cane sugar and mannite, which are also phosphorescent in the same circumstances. Finally, the author describes what he terms the finest case of mechanical phosphorescence he has ever witnessed. It happens when a certain quantity of large dry crystals of nitrate of uranium are shaken up violently in a glass bottle, through which magnificent flashes of light are seen to shoot. M. Phipson has experimented on a great variety of other salts, but none, except proto-chloride of mercury, gave any light that could be compared to that produced by the crystals above named.

M. Pelouze has lately found that at a certain temperature chloride of calcium can be decomposed by vapour of water, thus giving us a new source of hydrochloric acid. The action of the watery vapour is facilitated by the addition of sand or earth to the chloride of calcium, in order to prevent its melting.

M. Fermond, an indefatigable pharmacien, having left to itself, in a dark place for a period of two years, a solution of Senegal gum, found that, at the expiration of that time, the gum transformed into a kind of honey; at the bottom of the vessel was observed an agglomerated crystallisation, resembling in taste and appearance raisin-sugar, whilst the upper part of the flask was occupied by a syrupy liquid resembling liquid or non-crystallisable sugar, such as is found in honey. A slight quantity of acid (probably acetic acid) was present also in the liquid. M. Fermond says, that during this singular transformation he observed that no gas whatever was evolved; so that if, in this experiment, gum is really transformed into sugar the phenomenon is not due to fermentation, but to hydratation of the gum.

The transformation of gum and other ternary substances into *cane-sugar* is yet an unsolved chemical problem, similar to that of the transformation of coal into diamond. It is not difficult to transmute these ternary compounds into *raisin-sugar*, by a variety of means; but raisin-sugar has only half the sweetness of cane-sugar, so that the former product will, in all probability, never replace the latter at the grocer's, or the pastry-cook's.

Proceedings of Societies.

Photographic Society of London.

The ordinary monthly meeting of this Society was held on Tuesday evening, March 6th, at the Society's Rooms, Coventry Street. P. Le Neve Foster, Esq., M.A., one of the vice-presidents, occupied the chair, and there was a full attendance of members.

The minutes of the last meeting having been read and confirmed,

The Chairman alluded to the resolution passed on the last occasion, that the discussion on the Report of the Collodion Committee should take place at the present meeting. Mr. Hardwich would read a paper "On the Manufacture of Photographic Collodion," and it was for the meeting to determine whether they would hear the paper read in the first instance, or whether they would take the discussion before the paper.

Mr. Vernon Heath considered that the discussion should be taken first.

The Chairman said he was in the hands of the meeting.

Mr. Vernon Heath observed that no formula for the manufacture of the collodion had been submitted to the Committee, although, when the Committee was constituted, it was stated that they were to examine the formulæ of the various collodions, and that no collodion should be received without a formula.

Mr. White moved that Mr. Hardwich be requested to read his paper at once.

Mr. Vernon Heath regretted to have to oppose the motion. It seemed to him, that the report having been presented to the previous meeting, and its discussion adjourned to the present meeting, that discussion ought to take precedence of any other business. He had read Mr. Hardwich's paper, and found that in the course of his remarks he referred more than once to the report of the Collodion Committee, but that report, until it had been considered and disposed of, could not be regarded as an official document. He begged to move that the discussion on the report be taken in the first instance.

The motion having been seconded, was put and carried, the majority of the members not voting.

Mr. Vernon Heath, before entering upon the subject of the discussion, was happy to have an opportunity of expressing the acknowledgments which were due to Mr. Hardwich for the valuable assistance he had rendered to the Committee. (Hear, hear.) Mr. Hardwich, in fact, had done in this instance what he had invariably done whenever the interests of photography were concerned. (Hear, hear.) He (Mr. V. Heath) had the greater pleasure in making these acknowledgments, because he found it necessary to take exception to the report of the Committee. He was anxious to be perfectly understood. He did not in the least doubt the high quality of Mr. Hardwich's collodion—he believed it to be excellent—but he doubted whether it was wise or equitable to issue a report upon that collodion alone. At the meeting last year, when a letter was read from Mr. Hardwich, asking for a committee to report upon his collodion, the Chairman (Mr. Foster) then stated, in reply to a question from Mr. Shadbolt, that he was not aware that Mr. Hardwich took any exception to the form of a resolution passed by the Council, which was to the effect that the Committee should examine and report upon any collodion brought to them. He (Mr. V. Heath) turned to the report of the Committee, and there found the following passage:—

"Advertisements were issued, which were replied to by Messrs. Hardwich, Mayall, and Sutton; but the two latter of these gentlemen

did not send collodion in sufficient quantity to admit of its being thoroughly tested. Hence, though individual members have worked with the collodions of Mr. Mayall and Mr. Sutton, the Committee, in its collective capacity, can only pronounce on that prepared for them by Mr. Hardwich."

It seemed to him that the Committee was formed for the express purpose of examining various kinds of collodion, and reporting upon their respective merits. If—from the failure of manufacturers to send their collodions, or from any other cause—that intention could not be carried out, the Committee no longer possessed the power of exercising its functions, or, in other words, it ceased to exist. If, however, the Committee, without making any comparisons, sent in a favourable report of one particular collodiou, the effect would be to stamp that collodion with the approval of this Society. He had no hesitation in saying that, in consequence of the report which had appeared, the public would believe Mr. Hardwich's collodion to be by far the best in existence. Was the Society prepared to take upon itself the responsibility of that opinion? He (Mr. V. Heath) was sure that collodions were made which would compete satisfactorily with those of Mr. Hardwich. In dealing with the question, it must be remembered that the collodion of Mr. Hardwich was made for sale, just like that of Mr. Thomas; and this commercial character of the article should induce the Society to pause before giving the weight of its authority in favour of a particular collodion. It might seem a bold assertion to make in that room; but if certain members of the Society, calling themselves a committee, came forward to give the preference to Mr. Hardwich's collodion, he (Mr. V. Heath) had the right, as another member of the Society, to state that he knew other collodions which were far superior. He would not mention names, but he would state that, in February of last year, he took home a 20 oz. bottle of collodion. Between that date and November he took, perhaps, a dozen pictures, and among them were some negatives which, he believed, would be deemed satisfactory. Whether he worked in March or in November—allowing for a slight difference resulting from temperature—the period of exposure was as nearly as possible the same. A collodion of this nature he believed to be far more generally useful, especially to amateurs, than one which in a very short time lost that quality of sensitiveness which was so indispensable. The Society might be said to be legislating upon this question, as its decision would undoubtedly influence the great body of photographers throughout the kingdom. It was necessary, therefore, to use every precaution to render that decision a trustworthy guide. He regretted to observe that the names of only two-thirds of the Committee were attached to the report, and he certainly should have felt less strongly upon this question if the names wanting had been added. He knew one gentleman upon the Committee who agreed with him in his opinion of Mr. Hardwich's collodion. The meeting would, he felt sure, give him credit for what he had said without the necessity of mentioning the gentleman's name; it was enough to say that he was an accomplished manipulator, and one whose opinion would carry weight. Mr. Heath concluded by repeating that the remarks he had made did not at all affect the high estimation in which he held the services rendered by Mr. Hardwich to the cause of photography. (Hear, hear.)

Mr. T. Sebastian Davis said, that when it was proposed to form a Committee for the purpose of examining collodion, he was present, and advocated its formation. It was distinctly stated that no collodion should be received without a formula, giving the precise method by which it was made. He apprehended that the Committee had nothing to do with commercial considerations, but were a body of gentlemen associated together to investigate a subject, solely with a view to the advancement of photography. It was open to Mr. Thomas, or any other maker of collodion, to have come forward and submitted his collodion to the Committee, with the method of manufacture, and the members thereof would have pronounced an impartial opinion upon its merits. That the manufacturers had not done so, was not the fault of the Committee (hear); and he (Mr. Davis) considered that the Committee were bound, in justice to Mr. Hardwich, to give their best consideration to the collodion sent in by him. (Hear, hear.) Turning, now, to the consideration of the report itself, he (Mr. Davis) believed, in common with the gentlemen forming the Committee, the plain collodion manufactured by Mr. Hardwich to be one of excellent quality. Its mechanical structure enabled it to be spread very easily, so as to coat a large plate without difficulty, and it also adhered with considerable tenacity to the surface of the glass. He had not only tried some collodion which had been kindly sent him by Mr. Hardwich; but had also, with special precautions, made the pyroxyline, and found it to possess the important properties indicated above when made into collodion. Passing on to the consideration of the iodising solution, iodide of potassium, he observed, was by no means the best salt to be used, for two or three special reasons. The one principal objection to its employment consisted in its greater proneness to decomposition in the presence of alcohol and ether than any other iodiser, except, perhaps, iodide of ammonium. The reason of this rested, as he stated upon a former occasion, on the fact of its possessing an alkaline reaction. If an iodising solution were made by dissolving iodide of cadmium in combination with either iodide of potassium, magnesium, or calcium, in equal volumes of alcohol and ether, it would remain colourless for a lengthened period; whereas, an opposite result would follow with iodide of potassium alone. He did not think that the iodide of potassium added to a good plain collodion yielded a compound so sensitive as some known to photographers. Upon the subject of sensibility there appears to be one or two anomalies in the report under consideration. In the report it is stated in general terms, that, in the opinion of the majority, it is unsurpassed. They quote a letter from Mr. Frith, addressed from the East, in support of the statement, stating that at a temperature of 130°, he had been able to take moving figures. On a former occasion Mr. Frith stated, that the collodion he made himself was too sensitive, and he was obliged to correct this by adding acid to the nitrate bath. Mr. Delamotte, however, whilst in one part speaking confidently of its sensibility, stated in another, that it lost a good deal of its sensitiveness in three or four days, and that if possible it should be made to retain its sensitiveness longer. Mr. Morgan and Mr. T. R. Williams each spoke of its want of sensitiveness when used for portraiture; although, in one instance, the Committee suggested that this might be caused by the use of citric acid in the developer. He would presume, however, that in trying comparative experiments upon the relative sensibility of two kinds of collodion, they would be tested under precisely the same circumstances. Upon the whole, Mr. Davis believed that the formula now given by Mr. Hardwich for making pyroxyline was one according to which an excellent plain collodion might be made, and, if so, a great difficulty was surmounted, but that, even when a good plain collodion was iodised with iodide of potassium, a deficiency in sensibility and keeping qualities would exist. Mr. Davis concluded as follows:—As the Collodion Committee still remains in existence, I still hope that some of our members, or others, will yet succeed in devising an iodised collodion to submit to its consideration that shall equal in sensibility, as in other respects, any collodion that can possibly be procured. This result is not so much to be desired to enable photographers to make their own collodion, which it would not be desirable to do in small quantities, but rather for the purpose of extending a scientific acquaintance with this highly interesting subject.

Mr. Delamotte said that Mr. Davies had misunderstood his report; he did not complain in any way of the sensitiveness of the collodion when newly iodised, but simply desired greater stability.

Mr. Watson said that attention had been called to the statement put forth when the Committee was first proposed—that they should have a full account of the formula of every collodion submitted to them. On looking at the report, however, he did not find that the Committee had taken the trouble to examine any formula. If they had examined the formula of Mr. Hardwich as Mr. Davis had examined it, they would have found that they could not produce a good collodion with that formula, or, indeed, any collodion at all. Mr. Watson quoted the published report of the proceedings at the meeting in March last, when the object of the Committee was stated to be, to consider and report upon various formulæ for collodion; and observed that nothing of this kind had been done by the Committee—or, at least, there was no mention of it in their report.

The Chairman called Mr. Watson's attention to the following passage in the report:—

"Mr. Malone, on whom devolved the task of examining the formulæ, as regards their chemical aspect, has expressed his full

satisfaction with that by which the collodion sent to the Committee by Mr. Hardwich was prepared."

Mr. Watson said that this passage did not appear in the report as first printed and sent round to the members. (Cries of "Yes, yes.")

The Chairman was not aware of the existence of the report in any other form than as it had appeared in the Society's Journal. (Hear, hear.)

Mr. Watson proceeded to remark upon the practice of sending round to members printed copies of papers proposed to be read, and inquired whether this was done at the expense of the Society?

The Secretary (Dr. Diamond) said it had been the practice with him, as with other secretaries, since the first establishment of the Society, to send proofs of the papers to the members who were likely to take part in the discussion, as it was a convenience to them to know what was about to take place. The type was that in which the paper would appear in the Society's Journal, and, consequently, there was no expense incurred beyond the mere pulling of proofs. (Hear, hear.)

Mr. Watson proceeded to comment on certain expressions used by the Committee in their report.

Mr. Morley said that frequent allusions had been made to the formula of Mr. Hardwich, while many of the members were not in possession of information as to what that formula was. This was inconvenient; and he therefore moved that Mr. Hardwich's paper be now read. (Hear, hear.)

Mr. White seconded the motion, which was carried.

Mr. Hardwich then read a paper "On the Manufacture of Photographic Collodion." We propose next week to publish this paper *in extenso*, and, in the meanwhile, we present our readers with an abstract of it, embracing the leading points brought forward. The subject was divided into four parts:— 1, the materials employed in the manufacture of collodion; 2, the apparatus required; 3, the preparation of the collodion, with minor details of manipulation; and 4, general observations upon the quality of collodion produced. In considering the materials used, the author dwelt upon the importance of the cotton being pure, and chemically clean. To effect this cleansing, he had boiled the cotton in a dilute solution of potash, in order to remove any resinous matter which might be adherent, and which, if allowed to remain, would deoxidise the nitric acid, and cause a solution of cotton in the acid. With regard to the nitric acid employed, Mr. Hardwich observed, that he did not allow the use of an acid containing much chlorine as an impurity, as he had found that the chlorine had a chemical action on the pyroxyline, altering its properties, and rendering it less stable in collodion. Ether he regarded as the chemical next in importance to pyroxyline in the manufacture of collodion. The particular pyroxyline which he recommended required a pure ether, and he called attention to a condition very common in commercial ether, in which it liberated iodine rapidly from iodide of potassium, and possessed those other properties which were attributed to ozone. Care was therefore taken to free the ether from this ozonised principle, after which the collodion was very stable and sensitive. As regarded the spirit of wine, the author obtained a pure grain spirit, prepared by one distillation in a Coffey's still, and the specific gravity at 60° would be about ·817. This he had found very free from fusil oil, and in every respect superior to the cheaper qualities, and the methylated spirit usually sold. Turning to the preparation of collodion with these materials, the lecturer said it was desirable to lay in a large stock of the acids, and to ascertain the proportion in which these acids ought to be mixed. No further trouble would then be needed, until the stock was exhausted. The nitro-sulphuric acid was prepared by mixing 18 oz. measure of oil of vitriol of 1·845 sp. gravity, with 6 oz. of nitric acid of 1·45, and 5¼ oz. of water. The temperature was 150°, and the point to which attention was chiefly directed was to use the largest quantity of water possible without dissolving the cotton, since the quality of the resulting collodion seemed in every respect improved by using the nitro-sulphuric acid in the weakest possible state. The proportions of ether and alcohol in the plain collodion would be as 2 to 1. There were three iodising solutions to be used with this collodion — 1, iodide of potassium; 2, iodide of cadmium; and 3, a mixture of an iodide and bromide of ammonium aud cadmium. Numerous precautions were necessary in carryiug out the formula, which the lecturer described, and then proceeded to observe upon the general character of the collodion which could be obtained by following his directions — its chief peculiarity being in the pyroxyline. By using a greater proportion of sulphuric acid than of nitric in the preparation of the nitro-sulphuric acid, the film acquired great toughness and transparency, with fine, smooth texture. In making pyroxyline he had worked at 140° Fahrenheit, but about a year ago he raised the temperature to 150°, in order to increase the fluidity of the collodion. At that high temperature, however, traces of a body, supposed to be nitro-glucose, were generated, which caused the collodion to lose its sensitiveness more rapidly after being iodised. He recommended, for general purposes, the proportions of ether and alcohol to be half-and-half. If more alcohol were added, there was a loss of sensitiveness; and if less, the film became liable to dry up after being sensitised. The strength of alcohol best fitted for use in the above proportion was alcohol of ·805 for plain collodion, and alcohol of ·817 for the iodising solution. This collodion ought not to contain a greater proportion of iodide of potassium than 3½ grains to the ounce; supposing that quantity to produce too great opalescence of film, it might be corrected by introducing a little iodide of cadmium. With regard to the keeping properties of the collodion after iodising, Mr. Hardwich observed that an erroneous impression had been conveyed by the report of the Collodion Committee, possibly in consequence of some of the members of the Committee having worked in a bad light. The position of this collodion in respect to its keeping properties was intermediate, some kinds of pyroxyline displacing iodine from the iodide of potassium more rapidly, and others less rapidly. If the mixed iodides of potassium and cadmium were used as the iodiser, the collodion would retain considerable sensitiveness for many weeks. This collodion was not so liable to be glutenised by the iodide of cadmium as some other collodions, and if the nitro-sulphuric acid were used as weak as possible, the cadmium collodion might be satisfactorily employed upon the largest sized glasses. The white spots which had been spoken of in connection with the potassium iodiser did not depend upon any insoluble particles, but were merely specks of dust on the film. The same spots had been observed with iodide of cadmium, and as the mixture of ether and alcohol would dissolve 4 grains of iodide of potassium to the ounce, there could hardly be any insoluble particles when only 3½ grains were employed. The lecturer drew attention to the tenacity with which the pyroxyline adhered to the glass, and observed, that the principal fault he had detected in this collodion was the appearance of fine black lines occasionally on the picture. They seemed to arise from the use of acids in too concentrated a state in making the pyroxyline, and by employing a very weak nitro-sulphuric acid (which the cleansing process by potassa rendered possible), the defects alluded to were nearly removed. (Mr. Hardwich resumed his seat amidst loud cheers.)

The Chairman said that Mr. Sutton had sent a paper to be read to the meeting, but, as there was not time to do this, it would be taken, as usual in such cases, as a communication to the Journal of the Society, and the discussion upon it would take place at the next meeting. The subject of the paper was Mr. Sutton's new Panoramic Lens, a specimen of which was exhibited on the table.

Mr. Vernon Heath had much pleasure in proposing the thanks of the meeting to Mr. Hardwich, for the very careful and painstaking paper which he had read. Their best acknowledgments were due to gentlemen who came forward to give them the benefit of their information and experience on important matters which occupied their attention. (Hear, hear.)

Mr. Watson seconded the motion, which was carried unanimously.

In reply to a question from Mr. Heath,

The Chairman said that the report of the Collodion Committee had not been adopted by the Society. All that could be said of it was, that it had been received and considered.

In the course of the evening several new members were elected, and Dr. Becker, who, it was stated, is about to leave England, was elected an honorary member.

The proceedings then terminated.

[At the close, a member expressed some surprise that the discussion was not resumed after the reading of the paper, as

he had supposed would be the case. The Chairman had, however, invited discussion upon the subject of the paper at the close of the reading, and no response was made.]

Architectural Photographic Association.

On Tuesday evening a lecture was delivered at the rooms of the above Association, Conduit Street, by W. Burges, Esq., on French Portals. The chair was occupied by Mr. Lamb.

Mr. Burges commenced his lecture by saying that everybody knew how odious it was to make comparisons, more especially when they were not to the advantage of the individual to whom they might happen to be addressed. If the ancient and modern state of the arts were compared, in no one respect did we make a worse show than in our sculpture and our coinage. It was not so much in the technical processes that we failed—for the muscles and bones were generally in their right place, and the drapery, such as it was, generally studied from nature—but from a total want of interest in the subject. We saw that the artist had taken a model and copied some hap-hazard attitude, and when the work was purchased he was obliged to cudgel his brains for a title. If it was a female figure, he added a bird, and called it "Innocence;" or else he provided chains, and the composition became a "Slave." A male figure was "Ajax defying the Lightning," by the addition of a helmet and spear; but, by whatever name the work was called, very few cared about it, for it told no story and came home to no heart. And why was this? Simply because the sculptor was obliged by circumstances to work for individuals instead of the public; and when by any chance he had a public work to do, it was, for the most part, unconnected with architecture. The employment of both painting and sculpture, but especially the latter, without architecture, was very like wearing jewels without their setting; and it would be found, in all the best periods of sculpture, that art was intimately connected with architecture, and, in fact, was part of the architect's design. He was afraid that until this order of things was re-established, we could never hope to see a revival of Art; and, in the meanwhile, sculptors would probably go on studying from the objectionable Venus de Medicis, and the still more objectionable Apollo Belvidere, and produce such things as were seen congregated at the Brompton Museum and in our public squares, and all the while lament that they had no opportunity of showing what they could do; forgetting that their real mission was to make books of stone to instruct their fellow-citizens, and not to fill the so-called sculpture galleries of wealthy manufacturers, and the staircases of large houses, or make ridiculous busts of respectable nineteenth-century people, with nothing around their necks and a toga upon their shoulders. Were our buildings properly decorated, there would be employment for twice or three times the actual number of painters and sculptors, and the latter would experience the pleasure of having their public works praised, instead of seeing persons of taste turn their heads away whenever they passed a new statue. Everybody knew how much sculpture was employed in their buildings by the Greeks. In fact, their architecture was little more than the bones which were afterwards to be clothed with sculpture. The buildings of the thirteenth century were too vast for this to be the case with them, but there were parts in every edifice where sculpture was employed with so lavish a hand that the architecture was almost an accessory. Probably one of the most curious portals we had was that of Trophimus, at Arles. It was exactly the thing an ancient Roman sculptor would have drawn, had he been asked to design a portal in his own style, after having once had a sight of a thirteenth-century one, if such a thing were possible. At the same time, it must be confessed that the *ensemble* far surpassed any that the Romans ever did in architecture, for they were engineers and not architects. Nearly every part of Pagan architecture could be found in the portal at Arles. There were three systems adopted with regard to the arrangement of the jambs of the great buildings of the middle ages, all of which were good, and all of which succeeded each other. First, the columns were placed in nooks formed in the jamb; second, the jamb was formed by one large splay, and the columns placed in front of it; and the third plan was to leave the splayed jamb without any columns at all, but putting instead a row of figures standing on continuous pedestals, and surmounted by a series of canopies. The only objection to this was, that the arch must spring from a continuous frieze instead of columns. A fourth variety occurred when art began to wane in the fourteenth century. Then the great columns disappear altogether, and the part becomes a recess of hollow nooks, into each of which is placed a pedestal, figure, and canopy, as seen in the Portal de la Colonnade, Rouen, and in those at Cologne. But the great object of the sculptor's care was the tympanum, which occupied all the space confined by the arch moulds. In England, the French style appeared to have been carefully followed at some distance. Our west doorways were always very small compared with the size of the building—the English architects preferring to make niches all over the front of the building, and to put their figures in them. The most considerable approach to a foreign portal is, or rather was, to be found at Westminster, where we found so many French features; but even there the figures must have been very small, and the tympanum of the side doors simply consisted of a diaper, which was, exactly as at the great doorway, rather doubtful, inasmuch as it had been restored by Sir Christopher Wren, the size and series of arches containing four foils, the one in the centre having the arms of Westminster playfully inserted. It was sincerely to be hoped that the Dean and Chapter might hand over this doorway to Mr. Scott, and let him do as he liked with it. There was no old work to be destroyed, and, should the work be delayed a few years longer, a restoration would not take place at all, for by that time we should probably be so far advanced that we should put in our own notions and work, in every instance where we ought only to restore. The lecturer then referred to the door of Carlow Cathedral, to the screens and niches in the doorway at Exeter, and to the portals and arches at Peterborough, and gave an interesting description of the sculpture seen upon the buildings at Rheims, Amiens, Strasbourg, &c. He concluded by saying it was much to be wished that the nineteenth century would take the same views with regard to painting and sculpture which the classic and middle ages took of them. There would then be work, as he had said before, for twice the number of artists, and the work would be done better and more expeditiously. At present, our efforts were confined to decorating pediments of buildings unsuited to our climate, with statues unsuitable to our minds. It was of no use to say that we cared as little for the portico as for the Britannia, Commerce, Neptune, and other monstrosities which were placed above it. All the new and rising school asked for was permission to do the same thing for our national religion and history that was done for a pagan and effete mythology. Let them, at all events, be allowed to put the great truths of our religion and the parables of our Lord into living stone; and, when once this had been begun, there would be little complaint concerning either the work or the talents of our sculptors; for, depend upon it, there was plenty of the latter to be found, if it was only called in the right direction.

A vote of thanks to Mr. Burges was proposed by the Chairman for his very interesting lecture, which was carried by acclamation, and the company separated.

Photographic Notes and Queries.

THE PHOTOGEN *v.* THE LIME LIGHT.

Sir,—I indulge the hope of a space in your valuable journal, in reply to an article in your last number (March 2), in which you state that:—"At present, the photographer avails himself of Mr. Moule's invention, 'The Photogen,' which, while it has its merits, has also its disadvantages. What the photographer requires is a continuous, steady, vivid white light, capable of being sustained equally for an indefinite length of time. These conditions are, we believe, fulfilled by a New Lime Light, exhibited last week at a meeting of the Society of Arts,' &c.

I beg to say I am totally unaware of any disadvantages of my invention, "The Photogen," the continuity of which is more than sufficient for any photographic artist of ordinary ability and expeditious manipulation. Of course, its continuity depends in some degree, like all other lights, upon the judgment of the person who attends to a sufficient supply of the photogenic composition; and here it may be as well to mention, it has been proved that ten seconds is more than sufficient to produce the finest results, the ex-

hibition of which has caused some astonishment and admiration at the meetings of the principal Photographic Societies of Europe and America.

At the Royal Polytechnic Institution, a few months since, it was demonstrated before a large company of scientific gentlemen and artists, that the extreme diffusibility, "as well as vividness of the light given out by the Photogen," was infinitely superior to the Lime Light. The great depth of shadow shown by the latter proved its unsuitableness for portraits. It is also worthy of notice, that although the Lime Light has been known many years, and repeated attempts have been made in England, France, and America, no good portraits have been produced by it; while, in the short time "The Photogen" has been before the public, thousands of good portraits have been taken by it, and well-paying night photographic establishments have been established.

At the same time, it must not be considered that I have the slightest wish to injure the usefulness of the Lime Light for some purposes, though photographic portraits do not appear to be among the number. It may be suitable for photo-printing and micro-photography, where, hitherto, the Camphine Lamp has been used; and also, considering the heat evolved by the Lime Light, it may probably be useful in the laboratory to the experimental chemist, now that it is proposed to place it in the hands of the public in such a convenient form; however, like all other inventions, it must stand or fall by the test of a discerning public.

Rd. Moule.

HAS THE VAPOUR FROM PINE ANY DETRIMENTAL EFFECT ON THE NITRATE BATH?

Sir,—I am induced to trouble you again, in reply to "Oxouiensis." I beg to assure "Oxoniensis" I never felt *convinced* that pine vapour had a destructive action on the nitrate bath, and I think a careful perusal of my letter, in "News" No. 71, will satisfy him that I merely *conjectured* it, and gave my reasons for doing so. I then went on to show that pine vapour really possesses contaminating properties, instancing the behaviour of clean glasses and plates, prepared by Fothergill's and Taupenôt's processes, when exposed to its action. It is somewhat singular, in the same number of your periodical (71) is a report of a meeting of the French Photographic Society, at which M. Davanne mentioned the fact of sensitised plates fogging from the bad habit manufacturers had of blackening the inside of cameras and slides "with substances containing gallic acid, and partial reduction had frequently been observed in consequence, besides which, the essential oils in the varnish had a reducing action." I am very happy to be supported by the authority of so distinguished a philosopher as M. Davanne, and cannot help thinking, that if pine vapour (and that from essential oils) act prejudicially on *dried* preparations of silver, how much more likely are they to act in a similar manner on silver in *solution*, viz., in the most favourable condition for chemical action! Filtering the bath in question did not answer, although repeated several times; indeed, one could not expect, by using a *mechanical* remedy, to remove a *chemical* fault. The internal measurements of the pine box containing the glass bath are, 15 inches × 11 × 10, and the dipper used is of plate glass. In "News," No. 74, "J. Prideaux" asks me "whether the vapour from deal and that of gutta percha be one?" and, in reply, I must confess I have yet to learn that gutta percha emits any vapour, save during liquefaction. He then proceeds to give the history of two nitrate baths, which he informs us he spoiled, by using *bad* collodion—an occurrence I consider exceedingly probable; and then, as a *sequitur*, triumphantly demands, "Can 'H. R. R.' now assert, or think, that vapour from pine was detrimental to the silver bath?" "J. Prideaux" assumes that "if the vapour from pine injures the silver bath, the vapour from mahogany and gutta percha must have the same effect." I beg to remind him, that mahogany and gutta percha *do not*, like pine, contain a volatile oleo-resin, and therefore *cannot* furnish the vapour he supposes.

H. R. R.

FOTHERGILL'S PROCESS.

Sir,—As I have, these few weeks past, demonstrated by experiment the keeping qualities of Fothergill's process, I have thought I could not do better, for the encouragement of the doubting, than to send you two or three proofs of plates, exposed after four months' keeping, for your notice in the journal, should you have space, and the thing be worthy of your mention.

The first three proofs, Nos. 1, 2, 3, are from newly-prepared plates, and exposed last spring; the three last, from plates prepared for a trip last summer; but, owing to a disappointment, they were not used.

During this and the latter part of last month I have exposed the six plates, with but one failure from undue exposure; and it does not appear to me that they are in the least deteriorated by keeping.

C. Wilton.

Freemantle, Southampton.

[The specimens sent are unexceptionable.]

MR. THOMPSON'S BALANCE.

Sir,—In Mr. Thompson's excellent description of a balance, given in No. 75 of the "Photographic News," I find one point which, to me, is rather obscure. To give the balance sensibility, by bringing the centre of gravity a little below the fulcrum, the piece of lead is to be bent down on both sides of the beam *until it remains down at one end, and cannot be made to do so at the other.* Surely, the end of the beam which is loaded with lead must remain down, unless it be counterpoised by weights placed in the scales.

Is it supposed that the piece of lead is exactly counterpoised before one proceeds to "bend it down," as directed by Mr. Thompson? Is it my obtuseness or Mr. Thompson's slight obscurity that is to blame?

G. C. S.

MR. MAXWELL-LYTE'S METAGELATINE PROCESS.

Sir,—I beg permission to thank Mr. Maxwell-Lyte, through the medium of your journal, for the kind and prompt manner in which he has complied with my request.

The full, lucid, and practical account he has given us of his metagelatine process will, I feel sure, be highly prized by many of your numerous readers; while the advantages of so simple, and, I have no doubt, certain a process, over others, for which so many conflicting directions (involving a number of tedious manipulations) have been given, are obvious.

W.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Tuesday,	Mar. 13	—Photographic Society of Scotland.
Wednesday,	" 14	—Chorlton Photographic Society.
Thursday,	" 15	—South London Photographic Society.
Monday,	" 19	—Blackheath Photographic Society.
Tuesday,	" 27	—Birmingham Photographic Society.
Wednesday,	" 28	—North London Photographic Society,—Annual Meeting.
Friday,	" 30	—Photographic Society of Ireland.

TO CORRESPONDENTS.

*** *The series of "The Amateur Mechanic" will be resumed next week.*

F. S. (Bury St. Edmund's.)—Collect the deposit, put it in a pail, and wash it by allowing a gentle stream of water to flow in, then add a strong solution of common salt; a curdy precipitate will be thrown down, which is chloride of silver; from this curd pure metallic silver can be obtained by the usual process.

Constant Reader.—To do as you propose would constitute an infringement of copyright. By stating your object to the proprietors of the work, you might obtain their permission to make a copy; otherwise, you must get an *original* for yourself.

Iron Bridge.—The room facing the east will be preferable. Make the window as large as possible; the roof light is of no importance. Illuminate the sitter on the dark side by reflecting-screens of white paper or cloth. The dark room on the east side.

A Young Amateur.—We cannot undertake to recommend particular makers. By consulting our advertising columns, our subscribers will usually obtain all the information necessary to guide them in their selection.

J. C. F.—A single meniscus will answer, but allowance must be made for the difference between the visual and chemical foci. You can obtain an achromatic combination of any optician.

Andrew Mactear.—We have not been able to make room for the communication with which you have favoured us, our space being fully occupied with articles of immediate interest.

J. H. J.—1. The address is 33, Cornhill, E.C. 2. Of Mr. Mellnish, Haymarket. 3. The distillation can only be safely performed in a suitable laboratory, and is hardly worth the pains.

Selim.—Rice glue is a very suitable material for mounting positive proofs with. Damping the mount all over with a clean sponge will prevent "cockling."

Aston.—We cannot advise you to take out a patent. We do not think that any photographic patent has repaid the cost and trouble attendant upon obtaining it.

Sol.—You can make a solar camera for yourself, and not infringe any law by so doing.

Boston.—Add fresh nitrate of silver to your bath; it has doubtless become weakened and exhausted by use.

Low-tone.—Chloride of platinum is more economical for toning than chloride of gold.

B. H. suggests that *horn* would constitute a good dipper for the glass bath, and even a good material for baths themselves.

Camera.—Try the developing solution given in vol. ii., page 135, of this Journal.

Melos.—The principal manufactory of aluminium is at Amfreville-la-Mi-Voie, under the management of M. C. Tissier.

Alex.—Slate is better than wood for a washing-trough.

Silex.—Use a Waterhouse stop, which is placed between the lenses.

Constant Reader.—Your question has been answered in No. 69.

Oxon.—Move the camera between the taking of the two pictures.

Nut Oil.—You can do as you wish without impediment.

J. B.—Your developer is too strong, and contains too much nitric acid.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 80.—*March* 16, 1860.

MR. HARDWICH ON THE MANUFACTURE OF PHOTOGRAPHIC COLLODION.*

The manufacture of photographic collodion could not be described in a paper of the ordinary length, without omitting many important points, and treating others in a superficial manner; I am, therefore, compelled to make a demand upon your patience, but will do all that lies in my power to assist the comprehension of the subject, by dividing it into separate portions. To commence, then, with the chemicals which are used in the manufacture of collodion.

1. *The Cotton.*—For some time after I begun this process, I purchased cotton of Messrs. Hutton and Co., of No. 6, Newgate-street, City, without knowing anything of its manufacture, excepting that it was the finest quality procurable, and cost two shillings per pound. Afterwards, however, I thought it better to procure a variety of samples of cotton wool of different growths, which I was enabled to do by the assistance of a friend, who sent some fourteen or fifteen packets, grown in America, Madras, South Sea Islands, &c., and ranging in price from fourpence halfpenny to fourteenpence per pound. Having prepared the nitrosulphuric acid in the manner presently to be indicated, and found by trying it with the ordinary cotton that it was of the correct strength, I divided it out into equal measures, and immersed about nine or ten of the most characteristic of the cottons. The result was a failure in every case, the material being in a great measure dissolved by the acid. None of these cottons had undergone any cleansing, and therefore, although many of them appeared sufficiently white and pure, it appeared desirable to try the effect of boiling in a weak alkaline ley. The process proved more successful than I anticipated, and enabled me to prepare pyroxyline from a sample of cotton which was otherwise immediately disintegrated and reduced to pulp by the action of the acid. Evidently the cotton fibre is encased by a film of some resin, which the alkali converts into a soap, and removes in a soluble form. Supposing this resin to be left upon the cotton, it resists for a little time the action of the nitrosulphuric acid, and much squeezing with the glass rods is required to wet the cotton and make it imbibe the fluid: bubbles of air are entangled at first, and cannot easily be expelled, but almost immediately afterwards an evolution of red fumes takes place, and the fibre is destroyed by oxidation. On the other hand, with the cotton which has been previously treated with dilute potash, there is no difficulty whatever in making it absorb the acid; it sucks up the liquid like a sponge, and remains nearly unaltered in appearance during the whole time of the digestion.

I cannot say that I have invariably pursued the plan of cleansing the commercial cotton wool by boiling in a weak alkali, since I was not at first aware of the importance of so doing. When, however, I observed the effect of the potash upon the raw material, I at once applied it to the commercial cotton, and with manifest advantage, for I now obtain at least fifteen per cent. more in weight of pyroxyline, and secure greater uniformity in every other respect. Even from the finest qualities of the wool, traces of soluble matter are extracted by potash, sufficient to impart a strong yellow colour to the alkaline liquid, and which, if permitted to remain, would deoxidise that portion of the nitric acid immediately in contact with the fibre, and so far weaken it as to insure the immediate solution of a part of the cotton.

It is always desirable to simplify a chemical process, when it can be done with impunity, but at present I am disposed to recommend this alkaline treatment of the cotton, since in purchasing the finest qualities previously, in quantities of twelve pounds at a time, I did not find them to correspond, which I now think may have been due to the greater or less perfection of the cleansing process; and without doubt, the percentage gain in weight on converting the cotton into pyroxyline, has been greater and more uniform, since the preliminary treatment with a dilute alkali was adopted.

The cotton which I use is of American growth, but not always from the same State, since it appears that the manufacturer is guided, in making his purchases, by the varying price of the market. This cotton is sent out in packets of one pound each, which I divide into quarters, and boil each quarter gently for two hours, in a solution of two ounces of potash (at 2s. 6d. per pound) to a gallon of water. The mass is then lifted out, and well squeezed, with repeated changes of water for about twenty minutes, after which it is spread out to dry. The assistant to whom this preliminary part of the process is intrusted, receives full directions to remove the whole of the potash, and to disturb the fibre of the cotton as little as possible, since, if it become knotted and twisted, the action of the nitric acid will be interfered with.

It may, perhaps, be suggested that the potash is likely to exercise a chemical or modifying action on the fibre of the cotton, but I do not think that it has any such effect when used in dilute solution, and for a comparatively short time, as I advise. I formerly believed that a prolonged digestion in a somewhat stronger potash might, by degrees, affect the cellulose, and produce more or less of that condition which we see in old and rotten calico, as compared with the new material; but there need be no apprehension of this in the process above described, because cotton fabrics which have been weakened by wear and repeated washings, become more easily soluble in nitrosulphuric acid, whereas the cotton wool, by boiling in weak alkali, is rendered less soluble in the acids. I think it right, however, to mention that the use of the potash is a recent improvement, none of the collodion tested by the Committee having been prepared from cotton so treated.

2. *The Sulphuric Acid.*—I have not derived any advantage from using the pure sulphuric acid, but have found the commercial acid sufficiently good for the purpose. The strength is a little variable, and therefore it is better to take the specific gravity of several samples, and to select the strongest. Sulphate of lead and bisulphate of potash are mentioned as impurities of commercial oil of vitriol; but I never detect the latter in any samples which are sent to me, and very seldom the former; from which I infer that the great and increasing demand for oil of vitriol in the arts, has led to a gradual improvement in its manufacture. Traces of nitric acid are usually present in the commercial acid, but not to an extent likely to interfere with the preparation of pyroxyline.

3. *The Nitric Acid.*—I have been asked why I recommend so strong a nitric acid as that of sp. gr. 1·45, seeing that the acid is afterwards to be so greatly diluted with water. There are two reasons for so doing: first, because this acid is cheaper after the rate, and, perhaps, more uniform than a weaker acid; and, secondly, it is important that both the sulphuric and nitric acid should be as strong as possible, in order to allow of the use of sufficient water to raise the temperature on mixing at once to the proper

* Read before the Photographic Society of London, March 6th, 1860.

point, and so to obviate the necessity of employing artificial heat.

A saving of expense is effected by using the yellow acid, sold in commerce as "acid nitros," in place of the pure acid of equal strength; and for some time I was of opinion that this might be done with impunity; it subsequently appeared, however, that the quantity of chlorine in the "nitros acid" is more variable than I imagined; and on inquiry I find that it must necessarily remain so, inasmuch as the cargoes of nitrate of soda, from which the acid is made, differ in quality, and no preliminary process of purification is resorted to, with a view of eliminating the chloride. The effect of chlorine, when present in the nitric acid in more than a certain proportion, is to decompose the pyroxyline, and cause its partial solution in the nitrosulphuric acid. Hence it becomes necessary to work with a smaller quantity of water, and consequently an inferior pyroxyline is obtained, as I shall presently show. The chlorine also slightly modifies the composition of the pyroxyline in some unexplained manner, causing it to give more intensity in the photographic process, and lessening its keeping properties in collodion both before and after iodising. The pure acid answers perfectly, but I do not usually employ it alone, from motives of economy. The plan which I have followed has been to apply to the manufacturer, and ask him to pick out for me a carboy of the purest "nitros acid" in stock; this I test with nitrate of silver, and compare it with a standard kept for the purpose; if the chlorine exceeds a certain quantity, two carboys, one of pure nitric acid, and the other of acid nitros, are mixed in equal bulks. To give a notion of what the standard is, I may mention that if one drachm of nitrate of silver, dissolved in half an ounce of water, will throw down the whole of the chlorine contained in half a gallon of the acid, the sample is sufficiently pure.

Besides chlorine, the "nitros acid" contains peroxide of nitrogen, imparting to it a yellow colour; but this, I think, enters into a fresh combination on the addition of the oil of vitriol, and produces no effect upon the immersed cotton.

(*To be continued.*)

ON COMPOSITION AND CHIAR-OSCURO.—V.

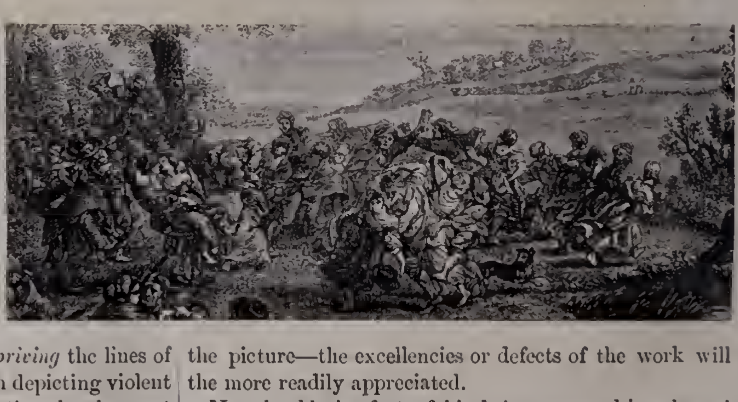
BY MR. LAKE PRICE.

"Concealing the art is one of its greatest beauties; and he best can accomplish that who can discover it under all its disguises."—Burnet.

The accompanying bit of "low art," by Brauwer, illustrates some of the principles to which the reader's attention was called in our last. The boor is perceived in a maudlin state, apart from his companions, in some "Herberg," but (in art) he cannot be permitted to topple over, which he seems otherwise sufficiently disposed to do. His balance is carefully provided for by the painter; the crock beside him, and the opposing line of the stick, are judiciously placed with attention to his equilibrium; whilst the secondary lines, of the chair and stool, are equally correct. Indeed, we have example in the Dutch and Flemish painters, that correct composition is as necessary in representations of common-place subjects as in the most elevated conceptions.

When, however, the artist wishes to depict thorough inebriety, we see, as in the case of the drunken "Silenus supported by Satyrs," of Rubens, that he *then* gives nature to the peculiarity by *depriving* the lines of their due balance. The power of Rubens in depicting violent action and motion has been previously mentioned; the next illustration, a "Kermesse de Village," shows that in the extreme of that apparent *abandon*, even the tipsy jollity of this boorish revel, the most precise attention to rules is observed; otherwise the *art*, which gives us so much satisfaction, would degenerate into an absurd farrago of meaningless lines.

The main arrangement of a pictorial composition may be considerably varied according to the nature and exigencies of the subject, and the individual feeling of the artist treating it; but we may be perfectly sure that, if the first principles —which we have seen illustrated—are flagrantly violated, the spectator, without knowing wherefore, will intuitively feel dissatisfaction with the work. Occasionally our admiration of skilful and dexterous manipulation, or good colouring, will, in a picture, cause weak, and timid, or erroneous composition to be overlooked; it is better, therefore, that the student should refer to engravings of the works of the various masters for analysis of their treatment of *composition*, since in the mere black and white—the attention not being diverted by adventitious aids from the lines of



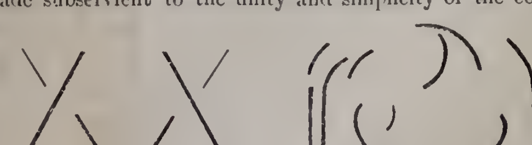
the picture—the excellencies or defects of the work will be the more readily appreciated.

Nor should the fact of his being engaged in a branch of art which may be of a lower description—and does not

necessitate elevation of sentiment, or which (as photography) will not allow him to depict motion, &c.—prevent him from forming his standard of taste and his knowledge of the true principles of general art by the careful study of the most refined and exalted examples. "*Facilis est descensus;*" and he will find that his due appreciation of the beauties of a "Madonna and Child," by Raffaelle, will make its chastening influence felt, and only heighten the qualities which a mere study from a female peasant may be made to possess.

The above illustration is from "The Last Communion of St. Jerome," by Domenichino. This is esteemed to be the second picture of the world; "The Transfiguration," by Raffaelle, immediately opposite to which it is placed in the Vatican, being considered the first. Nor does it at all suffer from its proximity to that great work, its high qualities enabling it well to sustain the trying comparison. In this fine picture we have an example of circular composition, carried through with perfect regularity in all its lines, whilst the pathos and elevation with which the delineation of the last moments of the dying recluse is treated by the painter, shows the superiority of Italian art over every other in the intellectual treatment of such a subject.

The reader applying to this composition the method of analysis which we have illustrated, will observe that the *lines* of the ministering priest, holding the consecrated wafer, are immediately opposed by the bold sweep of the retiring ones beneath, *a*, into whose mass the figures on either side are merged, and that the very folds of his drapery are made subservient to the unity and simplicity of the com-



a *b*

position; that the equilibrium of base of the central figure is restored by the upturned head of the young man, which

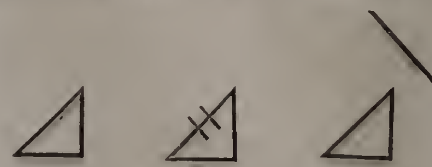
completes its angle, and that on either side the stooping figures are sustained by those beneath, which, also, in the right arm of the saint, and *lines* of the belt of the acolyte, and the feet, give other harmonious vibrations of line and perfecting of equipoise.

The curves, *b*, of the figure of St. Jerome are opposed by those of the acolyte—the stooping priest by the bending supporters; whilst the secondary lines of the remaining priest and other bearers also harmonise with each other—the straight lines being furnished by the architecture and the candelabrum. The upturned three-quarter foreshortened head of the young man is immediately *compensated* by the reverse above it, illustrating a principle to which we have previously adverted.* The foreshortened lines of the pavement in perspective take the eye into the picture; whilst their recall and being traced again (in light) beyond the group gives it relief, value to its darks, and depth and distance in the composition, whilst the general structure of the group is perfectly adapted for a fine chiar-oscuro. So much for the linear composition. In the sentiment and expressions of the heads qualities exist, the perfection of which can only be appreciated in the picture, although the illustration is of some size, and gives, as far as is possible, an excellent idea of this great work.†

"Angular" composition differs from the hollow group or "circular" composition, of which we have seen several examples, and consists of some vari-angled form being

adopted for the general outline—as a diamond, an irregular triangle, &c. But in good art the harmony of the composition must not be altered by this change in the form of the grouping, as the artist should, in various ways, contrive that the *balance* of his lines remains undisturbed.

An excellent example of learned disposition of lines in this class of composition, is seen in Gerard Dow's masterpiece—the "Femme Hydropique"—now in the Louvre. In this picture the general form of the group is a triangle, *c*, which, therefore, *per se*, is disagreeably out of balance; but, by the artist's skilful treatment in the lines of the arms, *d*, of the physician, and the stooping attendant, we have the equipoise of the composition most naturally restored. Observe, also, the manner in which the up and down-turned central heads compose with each other. In the entire work a long fold of curtain crosses the picture diagonally above the group, *c*, thus antagonising with its leading line.



c *d* *e*

An example of an indifferent composition of this class may be noted in "The First Ear-ring," by Wilkie, in his second manner. The disposition of the group of hands and arms is weak and unskilful, and furnish lines which are injurious; the dog is ill placed *upon* the perpendicular line of the female's dress, whilst similar forms, in the two vases *on either side* of the picture, are monotonously repeated. The omission of the larger, and accentuation of opposing lines of drapery in the females, would have benefited the composition. Wilkie, as we have said, generally composes admirably; but this example proves that even the best masters are not always infallible.

(*To be continued.*)

* This point will also be seen exemplified in No. III., both in the Gericault, and, under another form, in the Wilkie.

† The angels, &c., in the upper part of the picture have been omitted to economise space.

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. S. BOURNE.

Camera, lens, and tripod having been selected with judicious care, and a stock of chemicals purchased, the first operation is cleaning the plate. This, as I have previously stated, requires to be done thoroughly, or no end of stains will be the consequence. The simplest plan I know is to rub the plates well with a mixture of equal parts of ammonia and spirits of wine, rendered about the consistency of cream with tripoli powder, and when dry wipe them with cloths such as I have before described, finally polishing with a clean wash leather. This method is very effective, and no water is required, which, in cold weather, is an advantage.

The glasses should be cleaned just prior to using, because, if put aside for some time, the surfaces contract moisture and deleterious substances, which produce spotted and imperfect pictures. The *collodion* best adapted for this process is one which has been iodised some time, as it then gives a porous and creamy film, and adheres firmly to the glass. If these conditions are present, I do not think it much signifies whose make it is, or what may be the character of its pyroxyline, or the nature of its iodising compounds. It should possess good flowing properties, as, if it is thick and glutinous, it will be impossible to coat a large plate evenly and uniformly. As the proper coating of a plate is an operation of the greatest importance, every facility possible should be called in to assist in effecting it. A pneumatic plate-holder will be found very useful; in fact, large plates cannot be coated successfully without one. In order to avoid specks and lumps in the film, the collodion should be allowed to settle until it is perfectly clear, and then decanted into long 2-oz. bottles, which should be emptied after each operation, and refilled with the clear portion when next wanted for use. This simple precaution will save many an imperfect plate.

Two baths will be required, and the best sort we can have are the solid glass ones recently introduced, it having been

* Continued from vol. iii. p. 323.

proved that gutta percha exercises an injurious influence on the silver solution. One should be filled with distilled or pure rain water; the other with the silver solution. This is composed of 40 grains nitrate of silver to 1 ounce of distilled water, and should be very slightly acid. A new solution requires saturating with iodide of silver, to prevent it from attacking and dissolving the collodion film. This may be done, either by adding a few grains of iodide of potassium to a concentrated solution when preparing it, or by leaving a plate, coated with collodion, in it all night. When two or three dozen plates have been sensitised in a bath, fresh silver must be added to it to keep it up to the proper strength. When a bath has been in use for a considerable time, it frequently gets contaminated with organic impurities, and yields foggy and unsatisfactory pictures. In such a case, it is the wisest and most economical plan to precipitate the silver in the form of a chloride (which we may either sell or reconvert into pure nitrate), and make a new one. Great care should be taken to have it always well filtered.

The plate, having been coated with collodion, should present a film as level and as uniform as the glass itself; for be it remembered that, in this process, every irregularity in the film shows itself in the finished picture—consequently, it detracts so much from its perfection. Having allowed the collodion to set about half a minute, the plate is now to be immersed in the silver bath, with one steady and continuous motion; if a *pause* be made, the defect I have before stated will be the consequence; when it has been in one minute, it should be lifted up and down several times to get rid of the ether; and in from two to four minutes, according to temperature, it must be lifted out, drained, and immersed in the water bath which stands by its side. When the oily appearance is got rid of, which takes about a minute, it must be washed under a tap—over which a piece of muslin has been tied—for three minutes, with a gentle but moderate stream.

You are doubtless aware that Mr. Keene, of Leamington (who is usually considered as an authority in the Fothergill process), recommends a very different washing to this. He has been at considerable trouble to convince us that 4 drachms of water is sufficient, and must not, in fact, be exceeded for a stereoscopic plate; and the same proportion is to be observed for all larger sizes. On what such a proposition is founded, of course I cannot say; but I am certain it is not the result of a practical and extensive acquaintance with the working of it. While such a system might answer for plates intended to be kept only a few hours, or, in cold weather, a few days, I have learned, by a dearly-bought experience, that it will not answer when they are intended to be kept a fortnight or three weeks in hot summer weather. The large amount of free nitrate of silver left in the film rapidly hastens its decomposition, which is manifested by a red appearance over the whole plate as soon as the developer is applied. Mr. Keene has stated, that if a plate is washed, as I have recommended, with an unlimited supply of water, the film becomes so insensitive as to render it totally useless. How far such a statement is worthy of being credited, you will be enabled to judge, when I tell you, that the majority of the pictures in that album were taken on plates prepared precisely in that manner.

But to proceed. When the plate has been washed, it should be drained for about half a minute, then the preservative albumen is to be poured on, letting it run well up to every edge three or four times, and then it must be washed off under a tap as before. Great care must be taken that this is done thoroughly; as, if any surplus albumen is allowed to remain, the film, in those parts, will be partially or wholly insensitive. For this reason, I recommend the washing under a tap in preference to a dish, as you have then the advantage of a running stream. The albumen is made of equal parts of white of egg and distilled water, with the addition of 8 minims of liquor ammoniæ to each ounce; the whole is well beaten into a froth, and allowed to subside, when the clear portion is poured off for use. Some recommend a small piece of camphor to be dropped in to make it keep; but, when the ammonia is added, I do not find this necessary. The albumen should never be used twice, but a fresh portion for each plate. As it is cheap, and easily prepared, this is a matter of no consequence.

When the final washing is completed, the plates should be reared on clean blotting-paper to dry, resting by one corner only, collodion side to the wall. They must, of course, be carefully protected even from candle-light while drying, and by no means must they be stored away in the dark box until they are quite dry. Some recommend heat to be applied, when the surface is dry, to insure absolute dryness of film; but I do not think this advisable, inasmuch as a certain degree of moisture is favourable to sensibility; and as I know the film is sufficiently dry without it, it is not only a needless addition, but positively disadvantageous; it has also a tendency to make the film so hard that the developer has great difficulty in penetrating.

A few words on the dark box in which the plates are carried. This should not be made of common deal, as that wood exercises an injurious effect on the sensitive plates. It should be either japanned tin or mahogany—I prefer the latter—and, to insure complete security from the resinous effects of the wood, the grooves should be twice coated with shellac dissolved in naphtha.

Many ingenious contrivances have been invented for changing the plates after exposure. The one I use is the registered "Dark Box" of Ottewill and Co., which they can adapt to any description of camera. It answers admirably, and twelve or eighteen plates—quite sufficient for one day's exposure—can be transferred to the dark slide of the camera, and back again to the box in full sunshine, without the possibility of light gaining access to the plates. When the photographer is on an excursion, those which have been exposed can, of course, be replaced every night by others from the store-box. Those who do not like to go to the expense of a "dark box" of this description take a black bag, which they slip over their heads and fasten round the waist, having the slide and plate-box inside; but this plan is attended with considerable risk, and is not nearly so convenient.

(*To be continued.*)

PHOTO-ZINCOGRAPHY.

IN our last we referred to the process of photo-zincography, now so successfully employed by the Ordnance Survey Department in the reduction of Maps, Plans, &c. We have since been favoured with Colonel James's Report of the progress of the Ordnance Survey, together with the following communication, showing the success which has attended Colonel James's efforts. In an early number we propose to give a detailed account of the Photographic Establishment at the Ordnance Survey Office, Southampton, together with a specimen of the new art of photo-zincography:—

To the Editor of the "PHOTOGRAPHIC NEWS."

SIR,—I send you a copy of the report of the committee on the reduction of the Ordnance plans by photography, and you will observe that, so far as regards the production of perfectly accurate reductions of the plans from the larger to the smaller scales, we have perfectly succeeded; for the committee state that the greatest error in any part of the reduced plans does not exceed the $\frac{1}{100}$th part of an inch, and that the annual saving effected amounted to £1,615. The saving now effected amounts to £2,086 per annum.

Since the publication of this report, Captain A. de Courcy Scott, R.E., who has charge of this branch of the work, has been experimenting for the purpose of producing the reduced photographs in a state to be at once transferred either to zinc, or to the waxed surface of the copper plates for the engraver; and with the aid of Mr. Appel, who is so well known for his great skill in zincography, and the assistance of Corporal A. G. Rider, R.E., one of our photographers, we have, I think, perfectly succeeded; our success being due to the fact, that we

have in this establishment both first-rate photographers and first-rate zincographers, although I am myself neither the one nor the other.

The process by which the photo-zincographs of the ancient MS. from the Record Office (supposed to be of the time of Edward I.) were made, is in principle similar to that described as the carbon process of M. Asser, of Amsterdam, and which consists in coating paper with a solution of bichromate of potassa and gum, exposing it, when dry, under a negative highly "intensified," then applying lithographic ink to the whole surface, and afterwards removing that which is on the soluble portion of the bichromate of potassa, and transferring the copy thus produced to zinc.

But, although in principle the process is the same as M. Asser's, the success we have obtained arises from variations in the methods employed at almost every stage of the process, as, for example, in coating the whole surface of the paper with ink, and again removing the superfluous ink, both objects being obtained by passing the paper through the press on zinc plates, evenly covered with lithographic ink, and then again by using the anastatic process instead of the process of transferring to zinc.

The object we have in view is the production of facsimiles of plans, or MSS., or line engravings of any kind, and therefore we do not encounter the difficulties which those who seek the production of gradations in shade or half-tones do; but we have arrived at this important result, viz., that we can now produce, at a very trifling cost, any number of facsimiles of the ancient records of the kingdom, such as Doomsday book, or the Pipe or Patent Rolls, or we can take facsimiles of the MS. Bibles, &c., without even touching the originals, and this, I think, will be a most important application of the art of photo-zincography.—I am, sir, your obedient servant, Henry James.

Ordnance Survey Office, Southampton, March 14, 1860.

REPORT OF THE PROGRESS OF THE ORDNANCE SURVEY AND TOPOGRAPHICAL DEPÔTS, TO THE 31ST DECEMBER, 1859.—REDUCTION OF THE PLANS BY PHOTOGRAPHY.

In the Report of the Committee, of which Sir R. Murchison was chairman, it is stated that the annual saving effected by my having introduced this method of reducing the Ordnance plans from the larger to the smaller scales, amounted, in the year 1858, to £1,615.

Since then we have so much reduced the cost of the photographs, that the saving which will be effected will amount to £35,000 in the cost of the survey.

Up to this period we have exclusively used the paper prepared with nitrate of silver, for printing the number of copies required; but we have made experiments with the printing paper prepared with the bichromate of potash, gum, and lamp-black, or any other pigment, called the chromo-carbon process of printing.

The action of light on a coating of this composition produces the peculiar effect of rendering it insoluble in water, and consequently, when a sheet of paper coated with it is placed in the printing frame under the collodion negative, the outline of the plan is rendered insoluble in water, and remains on the paper when all the remainder of the composition is washed away, and we thus have a "positive" plan in ink of any colour which may be required.

In comparing the reduced plans obtained by this process with those obtained by the use of paper prepared with nitrate of silver, we obtain no advantage whatever, but, on the contrary, the prints are less clear and sharp in their outline.

But by a new mode of treatment of these *chromo-carbon* prints which has been introduced by Captain A. de C. Scott, R.E., who has charge of this branch of the work, and Lance-Corporal Rider, R.E., who is a good photographer, and also possesses a considerable knowledge of chemistry, we can produce very sharp, clear lines. The ink of the print after being soaked in a saturated solution of caustic potash or soda, becomes, so to speak, disintegrated, and is then in a state which enables us at once to rub down the print, and transfer the outline to the waxed surface of a copper plate for the engraver. This promises to be of great importance to us, as, after obtaining the photographed reductions of the maps, we have hitherto been obliged to make tracings from them in ink, for the purpose of transferring the plan to the copper, the expense and delay of which will now be saved, whilst we run no risk of any error being made by the draftsman.

We have also tried a method, which is still more valuable, and by which the reduced print is in a state to be at once transferred to stone or zinc, from which any number of copies can be taken, as in ordinary lithographic or zincographic printing, or for transfer to the waxed surface of the copper plates. To effect this, the paper, after being washed over with the solution of the bichromate of potash and gum, and dried, is placed in the printing frame under the collodion negative, and after exposure to the light, the whole surface is coated over with lithographic ink, and a stream of hot water then poured over it; and as the portion which was exposed to the light is insoluble, whilst the composition in all other parts being soluble is easily washed off, we obtain at once the outline of the map in a state ready for being transferred either to stone, zinc, or the copper plate, or we can take the photograph on the zinc at once.

This new method of printing from a negative is extremely simple and inexpensive, and promises to be of great use to us. Sheet 96, of Northumberland, has been transferred to the copper-plate from impressions taken by this process, and from the perfect manner in which we are able to transfer the impressions to zinc, we can, if required, print any number of faithful copies of the ancient records of the kingdom, such as "Doomsday Book," the "Pipe Rolls," &c., at a comparatively speaking very trifling cost. I have called this new method photo-zincography, and anticipate that it will become very generally useful, not only to Government, but to the public at large, for producing perfectly accurate copies of documents of any kind.

Dictionary of Photography.

Logwood.—A dye-wood obtained from Campeachy, in South America, the colouring principle of which is called *hematine*. Both water and alcohol take up its active principles. Its decoctions are rendered of a brighter red by acids; alkalies produce a purple blue colour. The salts of iron and of bichromate of potassa throw down a blue-black precipitate, which constitutes the basis of a process for printing positives on paper without the salts of silver. A sheet of paper, prepared with bichromate of potassa, is exposed to the light under a negative; it is afterwards washed in water to remove the salt from those portions of the proof which have not been acted upon by light, and then immersed in a decoction of logwood. The proofs are next washed with a dilute solution of bichromate of potassa. The pictures thus obtained are weak, but if the proof be immersed in a solution of sulphate of iron, of 5 per 100, before being put into the decoction of logwood, greater intensity is obtained, especially if the proof be immersed in a solution of gallic acid. This is termed the ink process.

Lunar Caustic.—A name given to fused nitrate of silver, cast into moulds, which form sticks of about the thickness of a quill. Nitrate of silver in this form is not suited to photographic operations, as it is usually contaminated with nitrite of silver and other impurities.

Manganese.—This metal is at present unapplied to the art of photography, but the changes in colour its various oxides experience, under certain conditions, would lead to the supposition that they possess photogenic properties. Binoxide of manganese is extensively employed to extract chlorine from hydrochloric acid and marine salt; iodine and bromine from iodides and bromides of potassium.

(To be continued.)

The Amateur Mechanic.

WOOD.

There are few materials more frequently required, or more easily fashioned, for the purposes of the dark room and studio, than the various kinds of wood; and whilst we can scarcely recommend the photographer to attempt to supersede the joiner or cabinet-maker, yet repeated occasions will occur when some facility in using the tools of both, and some familiarity with the nature of the materials, will prove of essential service in bringing experiments to successful issues.

One of the first considerations in connection with this subject is the possession of a few simple but necessary tools. A skilful and ingenious manipulator will frequently produce clever and useful contrivances, without further aid than may be derived from a pocket knife, a bradawl, and hammer. As, however, success may often be secured by the possession of a few inexpensive appliances, we shall offer suggestions as to the selection of the most useful tools.

Saws.—For most purposes of the amateur mechanic, one small tenon saw will be sufficient. Care should be taken in purchasing that it be well tempered, so that it shall neither break nor bend. Artisans are not unfrequently in the habit of tempering their own tools by placing them in melted lead; the steel assuming a straw colour, indicates the proper temper for a saw. This would, however, be generally too troublesome for the amateur; and he will do wisely to rely on the respectability of the dealer for supplying him with a proper article. He will also require the means for occasionally sharpening and setting the saw. "Setting" consists in punching each alternate tooth laterally, so that when in use the instrument shall clear its way by cutting a groove a little wider than the thickness of the blade. Very little "set" is usually required on tenon saws. The process is as follows:—First run a file along the edge of the teeth until they range evenly, and then lay the blade upon a piece of lead; now, with a square steel punch give each alternate tooth a gentle tap, taking care that each tooth shall be deflected an equal amount from the straight line. This done, turn the blade over, and proceed in like manner with the teeth which were omitted before. Having ascertained by looking down the edge that the teeth are all equally set, proceed to sharpen them. For this purpose a three-cornered file will be necessary; every tooth should be brought to a good sharp point; and if the file be held so that it makes an angle of about thirty degrees with the blade, so as to give something of a chisel edge to each tooth, the saw will cut clean and rapidly.

Chisels.—A few various sizes, commencing at about one-eighth of an inch, and proceeding upwards, will be desirable. They should be of well-tempered steel and kept sharp. One or two with stronger blades, known as mortising chisels, which can be driven with a mallet when necessary, will also be useful.

Gouges.—Two or three sizes for cutting grooves will be frequently convenient.

Hammers.—One small joiner's hammer will generally be sufficient; but a second larger one will often be useful. The thin end of a joiner's hammer will be more useful than the claw, which sometimes takes its place.

Bradawls and *Gimlets*, of each two or three sizes, will be useful.

Planes.—In the hands of persons not accustomed to their use, these are not always easy to manage. A little practice will enable the amateur to acquire sufficient skill for simple purposes. One size will generally be sufficient; the small one, known as the smoothing plane, will be best. In adjusting it for use, take care that the plane iron does not project much beyond the smooth surface of the wood in which it is fixed, or, cutting too deeply, it will be difficult to work.

A brace and assortment of centre bits, and a stock and assortment of drills, will be useful, but are not necessary.

A couple of screw-drivers, a large one and a small one; rasps and files; a pair of pincers; brads, nails, and screws; a steel punch, for driving brads thoroughly home; compasses; rule; square; glue-pot; and oil-stone, will about complete the equipment.

A bench vice, or something that will serve the purpose, will often be desirable.

When the amateur mechanic has ready access to an ingenious carpenter, many of the preliminary steps in constructing may be performed for him, and, in this case, he will be able to dispense with some of the tools we have named; but where this is not the case, the whole of them will often be found very useful, if not absolutely necessary.

Instrument for Cutting Wooden Screws.—As these screws are desirable in various kinds of photographic apparatus, where the amateur has not ready access to a turner, it is desirable that he should himself possess the means of producing them. For the purpose an instrument is sold at the tool shops. It consists of a block of wood having a hole through it, one aperture of which is smooth; the other a female screw. Within the smooth portion of the hole, a knife with a lozenge or V-shaped termination is fixed in a tangential position, for the purpose of cutting the thread of the screw. Rods of suitable wood—beech or hickory answer best—are to be made of the diameter of the smooth aperture, fitting sufficiently tight to require moderate force to enter. One of the rods being fixed vertically in a vice, and the block with its smooth aperture pressed upon it so as to cause the rod to enter, the two handles which are attached to the block are grasped one in each hand, so as to turn it slowly round, exerting at the same time a downward pressure; the result will be, if the operation be carefully performed, a sharp and accurate screw, to which a head may be cut of a portion of the rod.

With the screw-block an iron tool is sold to form the female screw or aperture, in which the screw just made is to work. An aperture just large enough to admit the tap is first made with a centre bit. The iron tap is then inserted and rotated with a downward pressure for a sufficient distance, the screw being tried from time to time, to see if the aperture just fit, as, if the tap be inserted completely to the head, without trying the male screw, the hole will probably be too large.

The amateur will do well to keep his tools in a small chest, in a dry place; those not frequently in use may be kept from rusting by being anointed with a little grease.

Of the qualities of various kinds of wood, it will not be necessary to speak at much length, as those most suited to the purposes of the amateur are not very numerous. The various kinds of deal—being light, strong, and elastic, cheap, and easy to work—are generally most useful to the amateur mechanic. The commonest and cheapest kind of deal, known as spruce, should, however, be avoided, being full of knots, and troublesome to work; unfit, indeed, in every way, for any kind of apparatus. Perhaps the best for most purposes is yellow pine—a wood which has, indeed, been recommended by good authorities as suitable for cameras. All kinds of deal have, however, the disadvantage of being somewhat porous, soft, and spongy, and, consequently, troublesome to work for certain purposes. From the same causes they are absorbent of moisture, and are therefore apt to contract, expand, warp, and cast with changes of the atmosphere and contact with moisture. If, however, the wood be well seasoned before working, it might, we apprehend, by careful varnishing with boiled oil, be largely protected from the effects of moisture. It would scarcely, however, be suitable for the dark slides and carriers of the camera under any circumstances. It is also a very unsuitable wood for plate-boxes, or, at least, the grooves of these boxes; the texture of the wood causing the grooves to be ragged and uneven, and the contraction and expansion rendering the box continually too narrow or too wide for the plate. Some we have seen were utterly useless on this account. This wood is readily procurable in lengths of twelve feet long, nine or eleven inches wide; of any thickness, from one-eighth of an inch thick—suitable for backboards of pictures—to almost any reasonable thickness.

Mahogany is the wood most commonly used in this country for cameras. There are several kinds, we believe, but known under the two generic names of Spanish and Honduras. The former is the hardest, heaviest, and most difficult to work; the latter is light and strong, and, when well seasoned, stands well. It is most frequently used for cameras.

Walnut—which is largely used in France for cameras, on account of its abundance—is rarely used in this country, being not so plentiful or cheap as Honduras mahogany, and more difficult to work.

Beech is a valuable wood, where toughness is required; it is very free from brittleness, and works clean.

Oak, as is well known, is one of the hardest and most durable kinds of timber; but it is difficult for the amateur to work.

Where wood is required—for any purpose—to cut with a clean, short grain, almost like cheese, we know of nothing better than plane-tree or lime-tree.

These comprehend the chief of the woods likely to be of service to the amateur, and will furnish him with material for carrying on almost any experiment where timber of any kind will be required. All the soft and porous woods—if used for purposes in which warping, contracting, expanding, &c., is an evil—should be well painted or varnished. An application of boiled linseed oil in the first place, and then a coat of varnish, will generally prove the best preservative. For the various hard woods, French polishing is not only an improvement in appearance, but also an essential preservative from moisture. If pine be used for cameras, it should be varnished with boiled oil, inside as well as outside, in order to secure thorough preservation from moisture.

Next week we shall describe the various modes of joining wood.

(To be continued.)

Correspondence.

FOREIGN SCIENCE.
(*From our Special Correspondent.*)
Paris, 10th March, 1860.

I HAVE frequently alluded in my letters to the influence of light upon various substances that are not actually used, at the present moment, in photography. It is a favourite subject of mine. Perhaps you remember my having mentioned, some time back, how differently coloured lights affected the growth of fly-maggots; how tadpoles grow to an enormous size, and never become frogs, when deprived of light, &c. Some animals are captured by means of light—I mean those lowest, or least organised, beings of the animal kingdom, called *hydra*, which have become celebrated since Trembley showed that they might be cut into a hundred pieces, and that each piece would, in the course of a few hours, grow into a new hydra! These wonderful creatures are easily captured by means of light. A handful of duck-weed (*lemna*) from some ditch, or stagnant pond, being put into a glass of water, the glass is then placed upon the chimney-piece of a chamber, in such a manner that the light of the window falls upon one side of the glass, whilst the other is in comparative obscurity. The following day, if that side of the glass which has been exposed to the light be carefully examined with a magnifying glass, the hydra will be seen sticking to it, or swimming in the water close by; and in no other position can these little creatures be discovered.

It is certainly wonderful that two of the finest colours known—namely, the purple of the ancients and the celebrated Chinese green, or *lokao*—*i.e.*, the finest colour furnished by the animal kingdom, and the finest colour furnished by the vegetable kingdom—are produced by the direct agency of light. At the last meeting of the Academy of Sciences, M. Lacaze-Duthiers read a paper upon the production of this Tyrian purple, and has again called attention to the wonderful part light plays in the formation of this colour—a fact that has long been well known. The only thing really novel in this long dissertation is the description by the author of the organs which, in certain marine mollusca, secrete the colourless liquid that finally turns to purple when exposed to the air and to daylight. This organ is nothing more than a small cluster of cells, situated at the surface of the animal's body, and quite distinct from the *corpus bojani*, or kidney of gasteropodous mollusca. The product secreted by this organ in the genera, *purpura* and *murex*, is a colourless, whitish, or slightly yellow liquid, which is extremely photogenic. "The action of light upon this liquid," says our author, "has for effect the successive development of the three simple colours, *yellow*, *blue*, and *red;* between which are observed, as effects of mixture, green and violet. When the experiment is made in diffused day-light—that is to say, slowly—the order in which the colours successively appear is observed in a very perfect manner. But whilst the yellow disappears as the action of the light continues, the blue remains constantly in a certain quantity, so that the red is never to be obtained alone, and the purple produced by these natural means is always more or less violet."

M. Lacaze-Duthiers has, moreover, experimented photographically with this Tyrian purple; he has obtained proofs upon silk, batiste, &c., which, although they do not offer all the perfections of ordinary photographs, present, nevertheless, in the numerous details, a great strength of tone. In an image thus obtained, we again meet with the colours above named: a greenish-yellow corresponds to the white parts, and a more or less dark violet to the dark portions, of ordinary photographic proofs.

Let us turn now to the famous Chinese green, or *lokao*. This substance, when upon silk, is the finest green yet known, and is principally remarkable for its brilliancy when seen by candlelight or gaslight. The Chinese have produced this dye for some time past, but their process has remained a secret until very lately. The subject has been investigated by some very celebrated chemists, and it results from their labours that we can not only produce the dye as the Chinese do, but can in great measure explain its formation. It was first of all discovered that the lokao was obtained by the Chinese from two species of exotic buckthorn (*Rhamnus*), with the bark of which a sort of decoction was made with lime, &c., and that the fabrics, on leaving the bath, were exposed on the grass to the action of light and air. Since these facts were known, experiments have been made upon the colours furnished by our common buckthorn (*Rhamnus frangula*, and *R. cathartica*); and the result has been that these plants, like the Chinese species, can be made to furnish a green colour, produced by the action of light, and doubtless identical with the lokao. The bark of the purgative buckthorn is boiled for half-an-hour with a sufficient quantity of water. After cooling, the clear liquid is decanted off, and to it is added its own volume of lime water; the next day a saturated solution of alum is poured in, and twenty-four hours later some carbonate of soda. After an hour or two of quiet, the clear liquid is decanted or filtered off. The solution is then fit for dyeing green; it is of a yellow colour, and when exposed in shallow basins to the action of the sun, it deposits the lokao, which, like that of the Chinese, is soluble in acetic acid, by which means it may be purified, as it is precipitated again by ammonia. The substance which gives birth to this green dye is an unknown colourless body, which, by the influence of light, becomes green. In France, 10,000 frs. were offered for the production of lokao, but I do not think the prize will be awarded, as the subject has been investigated by so many scientific men, and with such remarkable results, that the 10,000f. could only be divided among them, and the sum is too small for such a division.

An admirable quality in colours such as those just spoken of is, that, being produced by the direct agency of light, they cannot be decomposed or spoiled by exposure to it, as is the case with many of our most costly dyes produced by other means.

A recent number of the *Moniteur Scientifique* contains some observations on metallic chromium, by Professor Wohler. This interesting metal may be easily obtained, according to the author's researches, by smelting the violet chloride of chromium with melted zinc. A mixture is made of 1 part of this chloride, with 2 parts of double chloride of potassium and sodium (7 parts NaCl and 9 of KCl); the mixture is placed in an ordinary crucible, and covered with 2 parts of granulated zinc. The whole is then heated quietly until it melts, the crucible is kept closed and the fusion continued until the zinc is heard to boil; the fire is then diminished, but the mass is kept in a melted state for ten minutes more. The crucible is then taken from the fire and allowed to cool. The ingot of zinc which occupies the bottom of the crucible is extracted by breaking the latter, and the zinc is then well washed and dissolved in nitric acid. The metallic chromium remains as residue in form of a grey crystalline powder. Thirty parts of chloride furnish, in this operation, seven parts of chromium. The crystals of the latter, seen under the microscope, are grouped like fir leaves; they show, here and there, small rhombohedrons, and have a colour and metallic aspect somewhat similar to tin. The specific gravity of chromium at 20° centigrade was found to be 6·81. When heated in contact with the air, it becomes yellow and blue, like steel, without burning. Soon, however, it becomes coated with green oxide. When projected into the flame of a spirit lamp supplied with oxygen, chromium burns, but less vividly than iron. If thrown upon melted chlorate of potassa, it burns very vividly with a white flame, and forms chromate of potassa. Hydrochloric acid and hot sulphuric acid dissolve chromium, but nitric acid, even boiling, has no action upon it. When cadmium was used instead of zinc to prepare chromium, the moment the mixture began to melt, the whole was decomposed with an explosion. The most abundant source

of lactic acid is sugar of milk, from which the acid is obtained by fermenting the lactine (sugar of milk) with casein. Now, in this operation, which takes place from 15° to 35° (centigrade), a certain quantity of alcohol is formed; and the more of the latter, the less of lactic acid is produced. It has been found, moreover, that if the acid be saturated as fast as it forms, less alcohol is produced, and, consequently, more acid. Now, this saturation is generally effected by iron or zinc. But M. Luboldt has lately shown that, when iron is used, 25 per cent. of acid is obtained, whilst, if *carbonate of lime* is used instead, 44·25 per cent. of lactic acid is produced—a difference of upwards of 19 per cent.

Miscellaneous.

NEW MOTIVE POWERS.—Superheated steam appears destined to effect as great a revolution in motive power as steam itself accomplished upon its introduction as a motive agent. By recent improvements in the boiler, the practical working of this useful agent is no longer a matter of uncertainty. Among the advantages obtained by its use are—an enormous reduction in the evaporating surface, an immense diminution in the size of boiler and furnace, the absolute impossibility of explosion, a great diminution in the quantity of water required, the supply of distilled water furnished by condensation, no calcareous deposits, no cleaning beyond the mere application of a brush, no delay in getting the steam up, no loss of time; perfectly dry steam, no water being mixed with it; steam, the fixed temperature of which may vary from 400° to 1800° Fahr.; utilisation of the waste steam for the generation of fresh motive power; condensation as complete as it is possible to obtain, with the production of a vacuum which adds the atmospheric pressure to that of the steam; a regularity and steadiness of working, truly extraordinary; the power of doubling, trebling, quadrupling, &c., the force obtained, at any moment, without the least danger; a smokeless furnace, whatever the combustible employed, and the work of the stokers rendered less distressing: such are the advantages claimed; they are secured by keeping a quantity of tin, in a melted state, at the bottom of the boiler, which is no longer disruptured by tho sudden abstraction of heat through the instantaneous evaporation of tho water. No costly or onerous alterations are required to adapt this improved motive agent to existing engines of every kind; while great durability of boilers and a saving of 50 per cent. in fuel are guaranteed. Superheated steam has already a rival in hydrogen gas mixed with atmospheric air, and exploded by means of the electric spark. This is proved to be a very simple, economical, and efficacious motive power. Coal gas answers every purpose, and is mixed in proportions varying from 2 to 5 per cent. with atmospheric air. By the ignition of this mixture, and the heat arising from this almost molecular combustion, tho inventor obtains the dilatation of steam, of the carbonic acid formed, and of the nitrogen, so that his motor is high pressure. The ignition is effected by a small Ruhmkorff's induction coil; electricity is, therefore, the soul of this machine. The cost of working is about one half that of steam obtained from the combustion of coal. It is truly a domestic agent, and can be substituted for hand-power wherever required—in the factory, workshop, or domicile. Wherever gas can be laid on, a powerful force can be generated—instantly applied or extinguished! It may be substituted for horse power in vehicles, all that is required being a gasometer containing compressed coal gas; atmospheric air, of course, abounds everywhere. Pure oxygen and hydrogen are not employed, because they cause a violent and dangerous explosion. This very simple machine consists of a conical cylinder, with posterior and anterior compartments, separated by a piston. The gas is conducted through an ordinary stop-cock into each compartment alternately, and then mixed with the atmospheric air.

NEW ARTIFICIAL GAS FOR LIGHTING.—Tho obnoxious monopoly of the gas companies is likely to meet with a corrective agent in superheated steam, which, being charged with coal-tar, produces with marvellous rapidity and at an excessively low price, any quantity of very rich gas for lighting. Careful analysis has shown it to be composed of free oxygen, 1·8; oxide of carbon, 3; carbonic acid, 5·8; bi-carburetted hydrogen, 17·8; and proto-carburetted hydrogen, 71·9. Compared with ordinary coal gas, this artificial gas is found to contain nearly one-half less oxide of carbon, and twice as much bi-carburetted hydrogen; its intrinsic value is therefore twice as great. Besides, its composition proves that it is a very permanent mixture or combination, which remains intact for any distance it may be conducted. After being kept for five months in gasometers, it exhibited no change, and left no deposit. A generator capable of furnishing in four hours the gas necessary to light a city of thirty thousand souls, and to supply three thousand burners, is now in course of construction, so that its practical utility will soon be fairly tested. Tho entire absence of sulphuretted hydrogen in this gas is not the least of its recommendations to careful trial.

Proceedings of Societies.

GLASGOW PHOTOGRAPHIC SOCIETY.

THE first ordinary monthly meeting of the City of Glasgow and West of Scotland Photographic Society was held on Thursday, tho 1st instant, JOHN KIBBLE, Esq., the President of the Society, in the chair.

The PRESIDENT delivered the following inaugural address:—

GENTLEMEN,—I have, in the first place, to thank you for the honour you have conferred on me, by your unanimous election of me as your president, more particularly under existing circumstances, which I carefully explained to the gentlemen who called on mo previous to the formation of the present society. No doubt, it is known to many of you that I am no longer a practitioner in photography; indeed, it was my intention never even to venture within its contagious influence in any shape whatever, for reasons with which I will not trespass on your time at present; but of this I am certain, you could have selected one, in many respects, better qualified for the purpose —one who, by continuing to experiment in the photographic field, would, at least, have kept pace with the advancing knowledge of the science, and, perhaps, in some instances, even lead the van. Nevertheless, nothing will afford me greater pleasure than meeting you all as circumstances will permit, my not being resident in Glasgow.

It now wants but a few days of six years since the opening of the first photographic society in Glasgow, which took place on March 8, 1854. All of you are aware that considerable strides have been made in this fascinating science since that date; doubtless it has lost much of its interest in the shape of novelty, and many of those who used it empirically, and delighted in it simply as an exciting amusement, have abandoned it; but to those who entered into it as a science, the field seems to expand as they progress—one wonderful result succeeding another, until the mind becomes lost in a whirlpool of anticipation as to its ultimatum. It has spread its influence over the length and breadth of the land. Its votaries are to be found in all grades of society—from the wealthy peer, with his highly-finished apparatus, to the sun-browned peasant, with his simple camera of fir, void even of a focussing arrangement—his lens a spectacle eye, his results to be by no means despised; even many of the fair sex have enlisted under its glamour, and produced results not less fair than themselves. Indeed, the wonder is that, with their power of delicate manipulation, greater numbers have not taken to the pursuit, if not as a study, at least as a pastime. Often do I imagine what must be the feelings of those who, but a few years ago, looked upon it as a very pretty amusement, but who, under the arrogance of a self-satisfied opinion, pronounced its sphere of usefulness of very limited extent; that it might to a certain extent supersede the engraver's art, and so forth; but for any man to fritter away his time taking impression after impression, which the veriest tyro could do, was beyond their comprehension; and, without doubt, they spoke the truth, as they could have no comprehension of what they uttered.

Two years have not passed since I was myself taunted for devoting so much time to a pursuit that was pronounced not of an ennobling nature, and one in particular that no genius could be exercised or displayed in—a science in which the highest faculties of man were left as it were dormant; in short, that it was a mere mechanical operation. This brings to memory a friend of my own, who, in his early attempts, continued most perseveringly to prepare plate after plate, sensitising them under the in-

fluence of unobscured daylight, who, after popping them into the camera for a few seconds, bounded off triumphantly to his developing corner, but, alas! to add one more to his many previous mortifications, and, when told of his error, frankly confessed that he was under the belief that it was some peculiar virtue in the lens which caused the subsequent pictures. And, as regards its usefulness, will any one at the present day seriously question that? Has it not been made subservient to the copying of rare old documents that would scarcely hold together, preserving their time-worn appearance so faithfully that the copy could with difficulty be distinguished from the original? The medical profession recognise its value by having impressions of various surface diseases and wounds taken in their various stages, in copying specimens of anatomy, &c. &c. Is it not employed by the geologist, in his study of the rocks and their different strata, in having fac-similes of fossil remains, which would, from their position, have been otherwise lost to him? Is it not employed by the authorities of the country in cases of sudden accidents, such as railway collisions, to preserve proper evidence as to the exact position of matters immediately succeeding the calamity? Or, will any one who has given his untiring attention to astronomical descriptions of the moon's surface, retain in after years a mere fraction of the remembrance of its appearance, that he will, who has examined one of its most beautiful reflexes? And as for the wonders revealed in the microscopic world—a few years ago only patent to the few—how is it possible to estimate the invaluable boon conferred upon the mass—descriptions of which certainly could be obtained in expensive books, but difficult to conceive or be realised in the mind of the student? Photographs can now be had of various insects, sharp and distinct, whose diameters are trifling compared to the smallest visible moat that dances in the sunbeam. How invaluable its application to the botanist, not only in furnishing a perfect transcript of the externals of plants, but, by using transmitted light, he can have the very anatomy of the leaves, with a fidelity which beggars description! In winter, he can have the leafless skeleton of the gnarled oak, the graceful pendant ash, and the wide-spreading beech tree, so real to the life, although uncoloured, that, when seen by the magic stereoscope, it becomes reality itself. Still farther, if I mistake not, to the prosecution of photography as a science we are indebted for many invaluable ideas regarding the property of light, in giving to the leaves of the forest, and vegetation generally, those beautiful variegated hues presented to the eye. Its use to the chemist I have omitted, as it would be like separating photography from itself. Then, as to its wonders; how long is it since the Americans came down upon us with the startling statement that they had a "trotter" which went so tarnation fast that it left its shadow behind? Slow work, gentlemen, decidedly slow, when the present age can fix projectiles, moving at many times the velocity of the swiftest courser, before they have time to show their motion. Thus we behold an extravagant romance far outdone by a simple reality.

Seeing that so much that is wonderful has been obtained, may we not look into the future a little, and try if we cannot see colour looming in the horizon? According to the Newtonian or corpuscular theory of light, colour is considered not an inherent property of matter, but depends on the decomposition of light effected at its surface. Many are conversant with the facts, that the same body will present a different colour when seen under a different light; such as bodies which appear pink by sunlight, assume a blackish aspect when seen by burning alcohol which has been saturated or mixed with chloride of sodium; farther, that the same body at different angles, seen by the same light, will present different colours, as all must know who have marked the beautiful iridescent aspect of mother-of-pearl, or oil poured upon water, thin films of albumen on plates of glass, moisture or air between plates of glass in close contact, &c. &c. It becomes a natural conclusion, therefore, that colour depends on, or is caused by, the peculiar arrangement of the particles of matter of which the body is composed; that rays of light impinging against the same, are reflected, entering the eye, and striking upon its sensitive surface, or retina, excite it, causing that peculiar sensation called vision. How that sensation is produced has hitherto baffled the keenest intellects, and in all probability ever will. If the action of odours, which, in many instances—such as gases which can be laid hold of by the sensorious organs—cannot be explained further than that they act upon certain nerves, which in turn communicate with the brain, causing it to exist in that peculiar state which constitutes the sensation of smell, how is it possible that the action of that which is imponderable, non-tangible, can be explained—all knowledge being but the observation of antecedent and consequent, anything beyond that being merely conjectural? These circumstances considered, is it at all a Utopian idea to suppose that a sensitive surface may yet be obtained that will, if I may be allowed the expression, as it were, sympathise or submit itself to that force termed actinism, which in the subsequent development, will cause the precipitating body forming the visible photograph to fall under the same molecular arrangement as the surface of the body from which the rays of light are reflected? If so, a similar result must follow, and colour be obtained by one direct process. I am aware, or have read of colours having been obtained, but generally by a variety of subsequent processes—that is, different colours to develop different tints; also, certain colours having been etched by modes not yet given to the public.

One cannot refrain from regretting that photography, even in its present advanced state, had not been known at a much earlier date. What would our sensations now be, could we gaze upon a reflex of the twelve Apostles? or—with reverence be it spoken—of the great Apostle, our Saviour himself—that man of sorrows and acquainted with grief? It is but natural to suppose we would gaze on features of the fairest proportion, and on a form the most perfect that ever walked this earth; lineaments radiant with philanthropy towards a fallen race; or—to drop so serious a subject—"counterfeit presentments" of mighty Babylon the fallen, of Tyre and Sidon, and numberless other sacred subjects that would all but sublime one to gaze on?

No wonder the great Creator, in separating the light from darkness, or, in other words, permitting its uninterrupted action upon earth, pronounced it good. What would this fair and goodly earth be without it, even supposing existence possible? what the lovely, glowing laudscapes, with their variegated colouring, which the eye loves to rest on? Regions fitted for the blind; or even if seen under a homogeneous light, what would they appear?—dull uninteresting sights. We have only to imagine the absence of colour, and the result will be apparent.

In portraiture, it is not the fidelity only of the resemblance which constitutes the great charm of a photograph; there is a something beyond that, a species of identity of the beloved object represented long after the object has ceased to exist; the rays of light which were reflected from the original subject causing the image, are represented by a deposit forming the photograph, the particles of which again, by reflecting light, cause it to become visible to the beholder; so that, should there exist any prominent mark, such as a scar on the countenance from accident or otherwise, it will at once recall by association that particular period of life connected with it, and by the laws of suggestion be followed by a train of remembrances which may almost be called an epitome of the original's history.

You may often hear it remarked that uncoloured photographs are either too gloomy and rigid, or too whitewashed; admitting that to be true in many instances, even withal they are *like*. Place a dozen calotypes of well-known individuals on a revolving disc of two feet in diameter, rotating not less than sixty revolutions per minute, and I think I am not wrong in stating that this fraction of a moment's glimpse will enable any one to name the originals. Another very excellent test which I have often employed, is to present to a child three or four years of age a photograph of its parents, and you will find it will not hesitate one instant in lisping their names. I think it is rather an error to say that few are able to judge of likeness; we do not find it so in nature. When a friend advances, are we at a loss to identify him? Assuredly not. And yet, with all that is known of photogenic influence, without doubt our knowledge is but in its infancy. Look at the vast strides that chemistry and geology have made within the last twenty years. Much that was mere hypothesis in both studies has been confirmed, and in many instances disproved and corrected. Many difficulties of an almost insurmountable nature may present themselves to the photographic student; but, fortunately, the science is of that exciting and pleasurable nature, that more than rewards one for their labours; the greater the difficulty to be overcome, the nobler the victory when achieved. Let onward be the word; never relax your

exertions so long as sound sense corroborates your views. Battle, strain, and grapple with every obstacle; and a portion, at least, of your desires may be realised, if not the whole. To obtain a positiou in any of the arts and sciences, requires a considerable portion of a man's undivided attention; less may make him highly ornamental, but not one-half so useful. Now, will any one dare to say that a man fritters away his precious time in wishing to inform himself to a greater extent of the wondrous properties of that which the great Artificer himself pronounced to be good? or assert that no genius can be displayed in photography as a science? What is this genius? Is it an indefinable something, inherent in some specific studies only? or is it, iu truth, what the highest writer on the philosophy of mind, the late Dr. Thomas Brown, of Edinburgh, defines it? He says:—"He may, perhaps, be called a philosopher who knows exactly what others know, and produces with the same means which others employ the same effect which they produce; but he alone has philosophic genius to whose speculations analogous effects suggest analogous causes, and who contrives practically, by the suggestion of analogy, to produce new effects, or to produce the same effect by new and simpler means." If this definition is correct, name me the science that affords greater scope for the exercise of genius thau the photographic.

I will trespass on your patience no longer, but may state that I have refrained from touching on the rise and progress of photography in our own city; my time, previous to the meeting, being too limited to enable me to make a proper investigation amongst those who were early practitioners in the daguerreotype process. This I regret the less, as there are others here who are much better qualified to enter into the subject, and who, no doubt, will do it ample justice.

Mr. Andrew Mactear, one of the Vice-Presidents, read a paper on the "History of Photography in Glasgow and Neighbourhood."

A lengthened conversation followed the reading of Mr. Mactear's paper, in which Professor Taylor, Messrs. Kibble, Stewart, Ewing, J. Spencer, Hugh Wilson, and J. Cramb took part.

The Secretary, on the part of Messrs. Cramb Brothers, Glasgow, intimated that they had succeeded in producing perfect photographs on *ivory*, not artificial, but *real* ivory. Specimens, highly finished in colours, and quite *untouched*, were handed round, and elicited the highest commendation. Mr. Cramb announced that, for the preseut, the plan of production would not be disclosed.

The meeting, which was large and respectable, then separated, after according a hearty vote of thanks to the Chairman.

South London Photographic Society.

The usual monthly Meeting of this Society was held last evening in the Lecture Hall, Walworth. The Rev. F. F. Statham, President of the Society, occupied the chair. A binocular pocket-camera was exhibited by Mr. William Clark, constructed ou an entirely new arrangement, by which two pictures may be taken instantaneously at one operation. The instrument is ingenious and simple.

The minutes of the last Meeting having been read and confirmed,

The Secretary said that he had been requested to state that it was in contemplation to open an exhibition of photographs in connection with the Liverpool Society of Fine Arts. This was the first exhibition of paintings to which photographs were admitted, and he should be glad to see photography well represented by the side of its sister art, painting.

The Secretary then read a report from the committee appointed for the formation of an Exchange Club in connection with the Society, the arrangements for which were placed upon a good working foundation. It had been suggested that the members of the club should not be confined strictly to those of this Society; therefore they intended to admit all who were willing to pay a nominal yearly fee, for the expenses of stationery, &c., and specimens of their ability would be placed in the folio, with their name and address, and the words "for exchange" attached.

A conversation ensued as to whether it would be more advisable to establish a definite payment, or, in carrying out the exchanges, each party merely to pay the cost of transit. Eventually, at the suggestion of the Chairman,

Mr. Stephens moved a vote of thanks to the Committee for their report, and also that they be requested to carry out the further arrangements.

The motion was seconded by Mr. Fitch, and carried *nem. con.*

Mr. Hannaford then read a paper on the subject of "Positive Printing with Iron instead of with Silver." The process, he said, was made public by him last year, at a meeting of the North Londou Photographic Association, and he had now little further that was new to add, excepting some details of manipulation. He would, however, briefly recapitulate the process to be carried out. In the first place, French paper would have to be floated on the following sensitising solution, and then hung by one corner to dry, in the usual manner:—

Albumen, 1 part	1 ounce.
Water, 1 part	
Ammonio-citrate of iron, about 50 grains	
Bichromate of potassa, to saturation ...	

The time of exposure would be rather longer than for silver prints, but not materially so, and the picture should appear of a brown ochre colour, on a yellow ochre ground, showing details and half-toues as fully as an ordinary silver print. The picture must then be well washed, to remove the iron from the parts not acted upon by light, and darkened by being immersed in a saturated solution of gallic acid. This was the process in its simplest form, and he would now add a few instructions for obtaiuing a variety of tones, and hints that might be of use in manipulating. To obtain gold tones, expose and wash as before. Then immerse the print for two or three minutes in chloride of gold, ½ gr.; water, 1 oz.; wash thoroughly, and darken by gallic acid. By immersion in a very weak solution of iodide of potassium, a variety of pinkish tones might be obtained. The colours of these prints were by no means so brilliant as those of the gold-toned silver ones, but they were quite equal to the tones got by the old sulphur bath without gold. To obtain Prussian blue prints, operators must proceed as in the last case, but making use of a solution of ferro-cyanide of potassium instead of gold. On development by gallic acid, the picture will appear of a blue-green, which may be converted into a bright Prussian blue by a weak solution of hydrochloric acid, using only a few drops to an ounce of water. Red prussiate of potash, used instead of the yellow prussiate, gives a good blue-black, which hydrochloric acid converted into a dull blue. A solution of borax poured over a Prussian blue print very materially deepened the colour; and gum arabic mixed with the sensitising solution tended to give a ferro-cyanide picture a decidedly green tint; but when simply developed by gallic acid, the resulting positive was of a dark bistre tone, not, however, in any way partaking of inkiness. Gum arabic, however, was by no means a good size to employ, as the picture was very apt to wash off from some portions; but if gelatiue were employed, no amount of washing seemed to thoroughly remove the unsolarised iron, even though hot water be used. Foreign starch-sised papers were, therefore, far better than the English, which contained gelatine. When, however, albumen was used, as he recommended, the prints would bear any amount of rough washing, and for any length of time. The greatest difficulty to overcome was the slight—very slight—discoloration of the whites, to about the same extent as in developed silver prints. The plan he adopted was to immerse the picture in a weak solution of carbonate of soda, ammonia, or acetic acid. The alkali produced a not over-agreeable red tone, whilst the acid did not materially change the tint.

The lecture was illustrated by experiments, and specimens were exhibited demonstrating the process.

In reply to the Chairman, Mr. Hannaford said that the process could be stopped at any particular tint. For a certain class of subjects, such as large landscapes, the process would be very useful; but, for portraits, he should not recommend it in its present state. In answer to other questions, he said he thought that by this process they would be enabled to produce pictures on ivory, for he was not aware that there was anything in the process to stain that material.

The Chairman said there was one point of considerable importance in the course pursued by Mr. Hannaford, namely, the assistance photography would render to manufacturers requiring patterns.

Mr. Hannaford said there was no difficulty in producing a picture on a large scale upon cloth. The foundation of the process was taken from calico printing.

A vote of thanks was passed, by acclamation, to Mr. Hannaford for his address.

The SECRETARY (Mr. Wall) read a paper on "Photographic Washing."

The CHAIRMAN said, like a great many other things, this process, though simple in character, yet was of the utmost importance.

A discussion followed, in which Mr. Hannaford, Mr. Howard, Mr. Hervé, the Secretary, Mr. Leek, and the Chairman took part.

Mr. HERVÉ expressed it as his opinion that it was not so much a mechanical as a chemical change that was required to remove the glutinous substance which attached to the print; but he was going to make some experiments on the matter, and he would acquaint the Society with the results on some future occasion.

Some of the members expressed an opinion that washing was absolutely necessary to remove the chloride from the paper, which it would be dangerous to the print to remove by any strong chemical solution.

A vote of thanks was proposed to Mr. Wall, and carried with applause, and also to the chairman, and the company separated.

Photographic Notes and Queries.

MAGIC LANTERN SLIDES.

SIR,—In answer to your correspondent, "J. N. S.," and supposing that he practices one of the dry processes, say Fothergill's, and adopts the plan of "M. N. P. S." (*i.e.*, well washing the film), as I find that answers best, I will give the plan I follow. Suppose you want a copy of an engraving for a lantern slide:—

The first thing necessary is to get a negative of the engraving (size 3 inches square) by the ordinary wet collodion process. Now, take a 4¼in. × 3¼in. dry plate, and print as for a glass transparency (by gas light I find answers best), taking care not to push the development too far, as a weak impression is the best; in fact, if you print as deep as you would for an ordinary transparent positive, you will find, on putting it into the lantern, that it will cast a very dark impression on the screen, or something like Albert Smith's night photograph, "You know it's there, but you will not be able to see it!" You may get a very pretty effect by printing two transparencies from the same negative, and developing one a little darker than the other. These, when seen in the lantern, will have the appearance of day and night; and, to heighten the effect, you can have them painted with a moon in the sky of the dark one.

Any optician will cut the glasses circular, and the frames for mounting them can be had of most scientific instrument makers. For scenes from nature, you can print from a stereoscopic negative, and proceed as above. THOMAS CLARKE.

2, *Ordnance Terrace, Shooter's Hill.*

PHOTOGRAPHIC EXCURSIONS.

SIR,—I am an enthusiast in the "black art," as some one facetiously terms photography; but my business vocations allow me little time to enjoy my favourite pursuit.

I am, therefore, obliged to avail myself of every chance I can get of hastening into the country, with my camera and Fothergill's plates, and bringing back with me a few views, which will keep up the pleasant memories of the reality I can but seldom see.

Good Friday is one of *the* days I can employ in this way, and, weather and health permitting, I never miss it; but, from ignorance of the localities which I have from time to time visited, I have not unfrequently lost half the day in looking out for views, and that too, as you know, the best part of the day.

Now, it has occurred to me that, perhaps, some of your correspondents, who have "plenty of time and to spare," would kindly sympathise with a poor mercantile slave, and let him (and perhaps a good many more similarly situated) know where he can luxuriate in views of the picturesque, giving details of the best spots, &c., within a cheap and moderate distance of London.

Try what you can do, Mr. Editor, and let us know from you or them before the 6th of April, and oblige your subscriber,

City, E.C., March 10, 1860. EOTHEN.

POSITIVE PRINTING.

SIR,—With reference to Mr. Barber's friend's letter, read at the North London Photographic Society, it appears to me that one important point was overlooked, which is, that sulphuration is easily perceived to be taking place in the fixing-bath by the black deposit formed. I print largely, and use the same fixing-bath for scores of prints, strengthening, of course, with hypo. and carbonate of soda, and have never seen or heard of a trace of the yellow appearance in the high lights which denotes sulphuration; in fact, with the print well washed after toning, I cannot see how any sulphurising matter can be brought into the fixing-bath. H. HALL.

COLLODION.

SIR,—Your correspondent, "Oxoniensis," gives a formula for collodion, but no instructions as regards the preparation. Knowing, from past experience, the necessity for care when mixing different ingredients—as to the order and quantity in which they are added—I take the liberty of asking this, and whether he has found this collodion suitable for any but "out-door work."

The importance of the subject to all engaged in photography must be my apology for occupying your space. T. W. F.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Monday,	Mar. 19	—Blackheath Photographic Society.
Tuesday,	,, 27	—Birmingham Photographic Society.
Wednesday,	,, 28	—North London Photographic Society,—Annual Meeting.
Friday,	,, 30	—Photographic Society of Ireland.
Tuesday,	April 3	—London Photographic Society.
Wednesday,	,, 4	—Manchester Photographic Society.
Thursday,	,, 5	—Belfast Photographic Society.
Tuesday,	,, 10	—Photographic Society of Scotland.
Wednesday,	,, 11	—Chorlton Photographic Society.
Friday,	,, 13	—Norwich Photographic Society.

TO CORRESPONDENTS.

*** *In consequence of the pressure on our space, the communications of several correspondents are unavoidably deferred till next week.*

JERSEY.—The alum acts by virtue of the sulphuric acid it contains. The proofs must be well washed in several waters before they are immersed in the alum water. We have found about twenty drops of sulphuric acid to a quart of water answer the purpose very well—using it with caution and judgment.

S. D. S.—1. The ordinary albumenised paper will do. 2. Theoretically, the result will be the same; practically, floating is to be preferred. 3. The time will, of course, depend upon the hour of the day, state of the atmosphere, &c. Read Professor Roscoe's lecture, in the last number of this Journal.

M. M. D.—"Parts" simply imply ounces, drachms, or grains by weight, for solids; and fluid ounces, drachms, and minims by measure, for liquids. The avoirdupois weight is always understood. Your difficulty arises from considering that fluids are to be weighed instead of measured.

F. G. G.—You can obtain a negative on collodion by copying the positive in the camera, or by applying the specimen sent to a dried collodion film in the printing frame; in the first case you might arrange several specimens, say, four on one plate, if the camera be large enough.

TYRO.—You have added so many ingredients to your bath, that it would puzzle a conjuror to know what the compound consists of. You had better convert the nitrate into chloride of silver by the addition of a strong solution of common salt.

GEO. J. T.—We cannot print your reply to "C. J. M," as it would involve the recommendation of a particular maker, which is directly contrary to the rule laid down for such cases.

T. SMITH.—The Lime Light is the Drummond Light improved. Of course, you will have to make your oxygen gas, and provide a gasometer or suitable bag to hold the gases.

F. SCRIVENER.—Printing by development is a very difficult and uncertain process in inexperienced hands, and scarcely worth the trouble and vexation it usually causes.

PROGRESSOR.—A piece of ordinary india rubber will answer; so will vulcanised, if covered with a film of gutta percha.

LAC.—Spirit varnish is the best that can be used. Give two coats, not thicker than cream.

S. W. S.—The loop you propose is exactly the same as the one you object to, only the drawing is inverted.

A. W. B.—You have made the varnish much too thick; thin it with spirits of wine. White lac would answer better.

J. F. A.—Give it two coats of drying linseed oil; two thicknesses, or even one, will then generally suffice.

WM. DIXON.—You will find what you require on page 231 of the present volume (No. 72).

A. B. C. (Poole.)—You will not succeed in obtaining a satisfactory result on plain paper: it is better to use slightly albumenised paper.

W. E. H.—The method of obtaining transparent stereoscopic slides has already been given in this journal. See Nos. 2, 10, 17.

L. E. L.—The stains on your proofs are caused by hyposulphite of silver. Wash the proofs before putting them in the fixing solution.

ASTORIA.—The *cheapest* will be the *best* you can obtain for the money. It does not much signify who is the maker.

PROSPECT.—You will require a great deal of experience before you can expect to succeed as a professional photographer.

C. R. (Bristol.)—The address is 79, King William-street, E.C.

COLLOD.—The spots are caused by dust on the plate.

*** All editorial communications should be addressed to Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 81.—*March* 23, 1860.

ON COMPOSITION AND CHIAR-OSCURO.—VI.

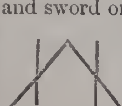
BY MR. LAKE PRICE.

"In every figured group the judging eye
Demands the charms of contrariety."—Du Fresnoy.

When the nature of the subject, as a formal ceremonial, or assemblage of standing figures, precludes the picturesque variety of line which is desirable, the resources of the art must be taxed to vary the otherwise monotonous effect which the repetition of many perpendicular lines would cause. In such case the direction of draperies, positions of limbs, some slight varying incident, should be taken advantage of by the artist to break the formality to which such subjects tend, and even the lines of accessories must be made available for this purpose.

The subject below, by Velasquez, is a good illustration of the manner of treating a very simple and natural group of figures, with vertical lines, which the artist contrives to vary and break *a*, sufficiently for such a subject,

by the sash and sword on the left, and cloak and sword on the right, all these lines leading through the perpendiculars to their apex, the centre head. The cut forms part of a larger composition, in which the artist's intention is rendered more evident by consecutive lines in the same direction. The groups in the foreground of the "Boar Hunt," by this master, in our National Gallery, are as fine specimens of treatment of mere groups of figures naturally arranged as exist; their excellences should be noticed by the student.

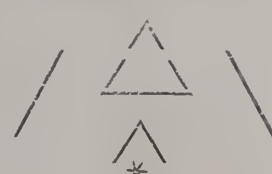


a

Raffaelle's cartoon, "Christ's Charge to Peter," is a fine example of treatment of a subject necessarily of great dignity and simplicity. In this composition, out of twelve, ten figures are standing perfectly upright; but, by the lines of the Saviour's arms, the kneeling Peter, and the advancing figure of St. John, these lines *b* become prominent, and, being further repeated in the draperies of the next figures, all feeling of formality is overcome; whilst, by the figure of Christ *standing apart*, the emphasis is laid, and he becomes at once separated from the Apostles, advantage being thereby also taken to relieve and vary the mass of the grouping, without trenching upon its grand simplicity. The "Death of Ananias" is in itself a compendium of composition in its most regular, elevated, and classic form; an analysis of its lines and treatment, in the manner we have previously shown, will prove to the reader the correctness of many of the principles which he has seen advanced, and, at the same time, be useful and instructive to himself. By means of photography, *fac-similes* of these sublime works have, in varied sizes, been placed within the reach of all, and should be carefully examined. The finest compositions are the above and "Paul Preaching at Athens;" but the due appreciation of the qualities to be seen in the whole series will in itself elevate the taste of the student, and form his judgment of the capabilities of the art.

b

Longo intervallo, Harlow's "Trial of Queen Katherine," is a fine example of composition of such a subject; the central



c

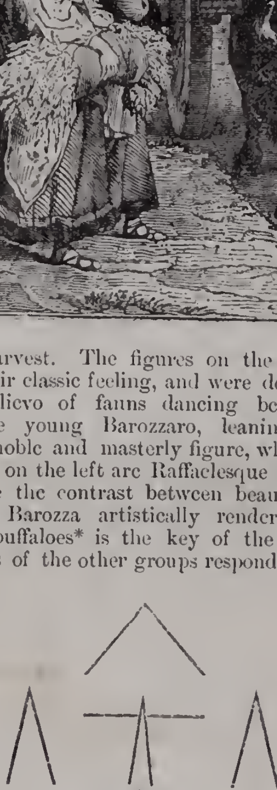
figures* of the *two pages* (attributed to Fuseli in the traditions of art) give the first impetus to lines, the repeating undulations of which finish in the compensating figures of Wolsey and the Queen *c*.

One of the finest compositions extant of ordinary peasant life is "Les Moissonneurs,"† by Leopold Robert, now in the Louvre. This picture eminently proves that the habitual contemplation of high Italian art gives to the painter's treatment of common-place subjects an elevation not otherwise attained. Leopold Robert has left few pictures; a fastidious self-critic, a slow and careful elaborator, these qualities alone would have rendered his works scarce, but his early and unhappy end in the Palazzo Pisani, at Venice,‡ arrested his pencil in the prime of his career, and deprived modern art of one of its brightest ornaments. The subject represents a rejoicing group of Roman peasants returning over the Campagna on the comple-

† See next page.

‡ A prey to that frequent bane of a studious temperament, melancholia, he committed suicide at an early age.

tion of the harvest. The figures on the right are quite antique in their classic feeling, and were doubtless inspired by a basso-relievo of fauns dancing before Silenus or Bacchus. The young Barozzaro, leaning between his buffaloes, is a noble and masterly figure, whilst the Contadina and child on the left are Raffaelesque in their conception. Observe the contrast between beauty, age, and infancy on the Barozza artistically rendered. The figure between the buffaloes* is the key of the composition to which the lines of the other groups respond, *d*.



d

Having, in our succeeding articles on composition, to treat of portraits, landscapes, &c., we cannot devote more space to figure composition; but, before quitting this portion of our subject, it will be as well to see what are its practical applications in the art to which this journal is especially dedicated. The conditions of focus, dimension, &c., narrow the photographer's field for action, and prevent his attempting many subjects which he would desire; he will find much difficulty in assembling at one time the various persons adapted for the representations he wishes; indeed, practically, the obstacles are so numerous, that few will be the number of *pictures* (worthy that name) which will be satisfactorily executed. On the other hand, NATURE, in whatever locality he may be, always offers him the ready means of producing small subjects and studies of figures, which shall, in their qualities of truthfulness and perfection of drawing, be most interesting, the more so in proportion to the *mind* he can infuse into them. Two or three fisher-children on the beach was all the material Collins found necessary to employ in some of his charming pictures; but there *must be intention*, and not, as we continually behold, gaping figures, standing in stolid file, as though mesmerised by the glass-eye.

Large groups of twenty or thirty persons are better photographed without any *preconcerted* arrangement, which is sure to terminate in disappointment, by the *gauche* manner in which they will stand "to be taken," and the certainty there is that the major part will infallibly stare at the camera to watch its doings.* By seizing an opportunity, very natural and fine groupings can be obtained from an ambush in *one* second (in open air and sunlight), parts of which will serve to set subsequently in groups of three, five, or more. There seems to be no medium; either they must be taken thus, or deliberately posed in proper composition in an undisturbed locality. In quiet, country places, all sorts of Gainsborough and Morland-like bits can be undertaken of cottage doors, farm yards, &c.; whilst those who are ambitious of trying their skill, and do not mind trouble or expense, may undertake an original composition, or may "reproduce," *ad vivam*, a Wilkie, Teniers, Ostade, &c., with the greatest truthfulness. Indeed, such a "theme" would be an appropriate introduction to more independent action. The student should remember that *every touch* in a picture, by a skilful artist, is directed by his feeling of its propriety in conducing to the perfection of the whole, so that the photographer must not be chary of making those successive corrections, of faulty portions of his work, which may be needed. Finally, if he wishes to excel, he must neglect no opportunity of improving his taste and knowledge by the examination of fine pictures and *appreciation of the principles on which they are produced*, and from them referring again to NATURE, from whose boundless stores all true art is extracted.

(*To be continued.*)

* Peasants are stupid and boorish; persons of education often fancy they know what should be done better than an artist; so that, from different causes, both are difficult to manage.

MR. HARDWICH ON THE MANUFACTURE OF PHOTOGRAPHIC COLLODION.*

4. *The Ether.*—Next to the pyroxyline, the ether is the chemical of most importance in making collodion, and I have always in this process felt myself to be at the mercy of the ether manufacturer. Indeed, the purity of the ether is of more consequence with pyroxyline of the kind which I recommend than with some other varieties of that substance; and I think that the success of the present attempt to give a definite formula for collodion, will depend very much upon whether the makers of ether can supply a uniform article in the desired quantity. What we need is an ether which, when mixed with an equal bulk of strong alcohol containing iodide of potassium in the proportion of 3½ grains to each ounce of the mixture, will remain colourless for several days in the cold season of the year. Commercial ether usually strikes a yellow colour in less than half an hour when treated as above described, but in that case it cannot be termed pure. It is quite possible to prepare ether, which will stand the test just mentioned, by proceeding in the following manner:—Take the best washed ether of commerce, and agitate it thoroughly with a small portion of dilute sulphuric acid, then introduce it into a retort, and distil over one-third of the total bulk. It first occurred to me to employ the sulphuric acid, from having noticed that ether which liberates iodine from iodide of potassium, often possesses an alkaline reaction to reddened litmus; and since the last distillation which ether undergoes in being purified is from a caustic alkali, I thought it possible that small portions of some volatile organic body of a basic kind, might be carried over with the ether. Whether this be so or not, I am assured, beyond a doubt, that the quality of the ether is materially improved by this final distillation from diluted sulphuric acid; and therefore the additional cost, which cannot exceed sixpence per pound, must not be considered.† The reaction of the pure ether is still alkaline to reddened litmus, thus showing that the whole of the acid remains in the retort: specific gravity ·722 to ·725 at 60°. At present I am not able to assert that the ether which I obtain is invariably constant in properties; so that there is room for further improvement, although when we compare ether of the present day with that which was sold in commerce a few years ago, the advance is very evident.

In connection with this subject of ether, I would add two or three more remarks. It is possible to make any ether stand the test of iodide of potassium most perfectly, by agitating it with a little dry carbonate of potash; but the resulting collodion is, in fact, injured rather than improved by such a process, since the carbonated alkali decomposes the gun-cotton. When, however, we obtain a sample of ether which has been distilled from sulphuric acid, and yet find it to remain colourless for a long time on adding iodide of potassium, we may be assured of its perfect freedom from the "ozonised" principle.‡

The difference between bad and good ether is seen most evidently after long keeping. Supposing light to be excluded, a pure sample of ether may be placed in a bottle, only half full, and at the expiration of two or three months it will scarcely become coloured on the first addition of iodide of potassium. Ether only partially purified will often stand the test of iodide of potassium when freshly distilled, but it will soon acquire the property of liberating iodine when it is stowed away for keeping. Supposing, for instance, that traces of *aldehyde* be present, which is not an improbable notion, this aldehyde would gradually absorb oxygen, and the ether would deteriorate. We must bear in mind that all varieties of pyroxyline have more or less tendency to ozonise ether by degrees, although some are more stable, and consequently superior to others in this respect. Hence, with the best quality of ether, the collodion will not stand the action of iodide of potassium so well as the solvents minus the pyroxyline; but when we have to deal with an inferior ether containing traces of some more oxidisable body, then the peroxide of nitrogen in the gun-cotton will soon act upon this substance, and the collodion will not bear very long keeping without acquiring the property of becoming immediately yellow on adding the iodiser. To show that this difficulty, although requiring further investigation, is likely to be eventually removed, I may mention that a large quantity of collodion which I sent to a friend in Australia, was stated by him to remain quite colourless for a time on adding a potassium iodiser, and, in consequence, the sensitiveness was very great. I do not consider that any trace of alkali was present in this case to account for the non-liberation of iodine; if so, the collodion would have been slower than usual, instead of being more rapid. The absence of the ozonised condition after so long a voyage, depended, doubtless, upon purity of the ether and stability of the pyroxyline. And with an equally good ether the same result might again be obtained.

A few words on the subject of "methylated" ether. I am quite ready to allow that a great improvement has of late been effected in the manufacture of this substance, and that it would not always be easy, even to an experienced person, to distinguish it from the pure ether. Nevertheless it is certain that the use of methylated ether ought not to be encouraged in photography; for, independently of an action upon the bath which some attribute to it, how can we expect the same uniformity of product when an inferior spirit of wine is usually taken for methylating; and when, in addition, it is not in the power of the manufacturer to exercise any control over the naphtha which the Government directs to be added? We know that the purity of ether depends very much upon that of the alcohol from which it is produced, and those foul-smelling organic substances which are often found in ether, are really derived from foreign bodies originally present in the spirit. Observe, that I am now speaking of ether for the finest description of collodion, iodised with an iodide only. When bromides and iodides are employed conjointly in collodion, the sensitiveness is not so much affected by the state of the ether, and hence the above remarks would perhaps be less urgently called for. Even then, however, the advocates of methylated ether may well be reminded that in the case of collodion prepared with equal bulks of ether and alcohol, the substitution of the cheaper form of ether cannot make a difference of more than one penny per ounce wholesale price.

5. *The Alcohol.*—For a long time I used rectified spirits of wine for the preparation of collodion, and increased its strength, as far as necessary, by means of dry carbonate of potash; but, having at length become dissatisfied with the smell of certain samples of this rectified spirit, I was induced to employ a strong alcohol obtained by one distillation. In rectifying spirit, a liquid, known as "faints," is sometimes used, containing alcohol, either strong or weak, but contaminated with essential oils; and, since it is most important in photography to avoid that particular class of organic bodies, the grain spirit obtained by one distillation in a Coffey's still is to be preferred. In taking the specific gravity of this spirit, which I have found to vary from ·817 to ·819 at 60° F., we see at once the advantage likely to accrue from its employment, since the fousel oil, which boils at a more elevated temperature, cannot rise so high in the still, and is separated. The smell of this spirit is very sweet; and although it is not quite so strong as is required, yet, by converting a portion of it into alcohol of ·805, by means of dry chloride of calcium, and mixing this with the remainder, the correct specific gravity may easily be obtained.

The reaction to test-paper of the pure grain spirit should be quite neutral; but I find, in some instances, that a trace

* Continued from vol. iii. p. 332.

† The idea is to collect the first portion of the distillate for photography, and to use the remainder for medical or other purposes.

‡ The condition of ether known as "ozonised," is the same as that to which the term "acid" is often applied; but in testing samples of ether, I rarely or never find them acid to test-paper.

of acid is present, so that each half-gallon of spirit requires about one drop of the standard solution of ammonia alluded to in the third division of this paper, under the head of "Preparation of Plain Collodion." I have never yet found in this or any other spirit the alkaline reaction which is exhibited by ether.

6. *The Iodising Compounds.*—A few words will here be sufficient. It has been stated, as an objection to the iodide of potassium, that it cannot often be obtained in a pure form; but, so far from such being the case, I have found the yellow crystallised iodide of potassium—that from which the last traces of carbonate of potash have been removed by neutralising with hydriodic acid—to be purer than any other iodide which is sold. It contains usually a little sulphate, but this appears to be inert. Of iodide of cadmium I cannot speak so positively, some samples being only partially soluble in spirit.

Iodide of ammonium is now prepared of good quality by a process of double decomposition; but formerly hydrosulphate of ammonia was employed in its manufacture, and the product was then inferior, from the presence of traces of a sulphur compound. In other samples of iodide of ammonia I have detected large quantities of carbonate of ammonium, introduced for the purpose of keeping the salt in a colourless condition, and also of sulphate of ammonia. It has been stated by a respectable authority, in the pages of the *Photographic Journal*, that iodide of ammonium must be used whilst fresh: this, I think, is a mistake, since I have kept it for more than three years in an ordinary bottle; and, with the exception of a little colouration, which does not affect its action in bromised collodion, it is as good as at first.

APPARATUS, &c.

The following articles will be found useful in preparing collodion on a large scale:—

1. *Porcelain Pots for the Acid.*—These I purchase of Messrs. Simpson, Maule, and Nicholson, Kennington-road, Lambeth. They are about 7 inches high, 4 inches in width at the top, and are provided with covers and handles; also with a rim near the upper part, which serves as a support when heat is applied. The glaze is very good, and is unaffected by the acid. They hold an imperial pint and a half.

2. *Glass Spatulas.*—These are made of thick plate-glass, and may be obtained at Messrs. Browns' warehouse, Farringdon-street. Length, 10 inches; breadth, $1\frac{3}{8}$ inches; thickness, $\frac{1}{4}$ inch. I find them to answer better than rods for immersing and removing the cotton.

3. *Hot Air-bath.*—This is a simple apparatus for warming the pots containing the acid mixture, when the temperature is inadvertently allowed to fall too low. It consists of an open vessel like a saucepan, made of strong sheet-iron fastened by rivets, standing on legs over a Bunsen's burner. In the part corresponding to the cover of the saucepan is a round hole, into which the porcelain pot drops, until it is caught and supported by the rim. The pot does not touch the bottom, but approaches very near to it, and hence all danger of cracking is avoided, whilst sufficient heat can be obtained in a few minutes.

4. *Thermometer.*—Select an instrument with a wide column of mercury, so as to be easily seen by gaslight, and with a large bulb, that it may be sufficiently sensitive. It is quite necessary to compare the thermometer with a standard instrument, since I find that the cheaper thermometers constantly vary, to the extent of several degrees. It is useful also to have a second thermometer hanging up, with which to compare the first, since the column of mercury sometimes separates, leaving a vacant space, and thus indicating too high a temperature.

5. *India-rubber Gauntlets.*—These are indispensable, as a protection to the hands in making large quantities of pyroxyline: they may be obtained of Messrs. Matthews and Son, Charing Cross.

6. *Trough for Washing.*—It consists of a strong deal framework, three feet long by two feet wide, lined inside with gutta percha. The water passes in through two tubes, one at the end, and the other near the centre, each being pierced with fine holes, so as to deliver the water in a series of jets, and keep up a constant current at every part of the tray.

7. *Steam Bath for Drying Cotton, &c.*—This may be made by first constructing a flat zinc tray, two feet wide by four feet long, with a tightly-soldered cover, and standing on short legs. The water is boiled in an ordinary tin saucepan, and the steam conducted by a pipe about three feet long, well rolled in list or flannel, into the closed tray, the condensed water being allowed to drop out at the end. Pyroxyline may be dried with safety upon this bath, since the flame is placed at a sufficient distance; and the heat can be regulated at will by adjusting the supply of gas. If the upper zinc plate be covered with flannel or calico, the temperature does not rise higher than 130° Fahrenheit.

(*To be continued.*)

ON FIXING THE COLOURS OF DAGUERREAN PICTURES.

M. Toussaint, of Rouen, has communicated to the *Académie des Sciences* a process for fixing colours on a daguerreotype plate. It consists in pouring upon well-polished plates a mixture composed of—

Alloxane ...	... $C_8N_2H_4O_{10}$
Leucine ...	... $C_{12}H_{13}NO_4$

in very thin layers. The plate is then submitted to the vapour of essential oil of pinks, then to mercurial vapour, to chloride of gold, and to hyposulphite of soda, as in the ordinary daguerreotype process.

M. Toussaint has arrived at this result only after numerous attempts, and at present he cannot give the precise quantity of each substance; but he thinks it is very promising, for the future of his discovery, to have indicated the substances to which he owes a favourable result. He hopes, with time and patience, to complete his discovery by furnishing the exact formula.

Alloxane and leucine have not, that we are aware, been employed in photography hitherto; and, as they are substances by no means familiar, we give a description of them, derived from M. A. Cahour's *Leçons de Chimie Générale Elémentaire.*

Leucine.—A product derived from albuminous matters, in the same manner as glycocoll is derived from gelatine.

When caseine is left exposed to the action of air and water, it enters into a state of fermentation, disengaging a very fetid odour, and yielding a peculiar crystallisable substance, first observed by Proust, and to which Braconnot, who subsequently examined it, gave the name of *aposépédine.*

When fibrine is boiled with diluted sulphuric acid, or rather when fibrine, albumen, or caseine are acted upon by caustic potassa, a crystallisable substance is obtained, designated by the name of *leucine.* Analysis, and examination of the properties of these two bodies, have demonstrated, in the clearest manner, that they are identical.

Leucine, produced either by the putrefaction of animal matter, or by the action of acids and of alkalies upon the same substances, may be obtained by much simpler reactions, which throw light upon its true nature, and show us that it is homologous with glycocoll and alanine.

Leucine may, in fact, be produced in the same manner as this last-named substance, by the action of hydrocyanic acid upon valeric aldehyde:—

$$C_{10}H_{10}O_2+C_2NH+2HO=C_{12}H_{13}NO_4.$$

The same product can also be obtained by the reaction of oxide of silver upon thialdine:—

$$C_{12}H_{13}NS_4+AgO=4AgS+C_{12}H_{13}NO_4.$$

Leucine, in a state of purity, appears under the form of pearly scales, soft to the touch. They are lighter than water, and present a very great resemblance to cholestrine. But little soluble in cold water, leucine dissolves readily in boiling water: slightly soluble in ordinary alcohol, it is still less so in absolute alcohol: it is insoluble in ether.

At 310° Fahr. it sublimes without melting, in the form of snowy flakes; it dissolves in the acids, and forms crystallisable compounds; it also combines with bases and salts in the same manner as glycocoll.

Kept in a state of fusion with its weight of caustic potassa, until the ammonia it disengages is mixed with free hydrogen, leucine is transformed into valeriate of potassa.

When boiled with a mixture of sulphuric acid and peroxide of manganese, it decomposes, yielding valero-nitrite, carbonic acid, and water. Nitric acid decomposes it in the same manner as glycocoll.

The composition of leucine is expressed by the formula,

$$C_{12}H_{13}NO_4.$$

Alloxane is one of the products of the action of nitric acid upon uric acid. It is prepared by adding to 1 part of uric acid 4 parts of nitric acid of sp. gr. 1·4 to 1·5, in small portions at a time. The uric acid dissolves with effervescence; it is important that the mixture be cooled in order to avoid ultimate decomposition. White crystals are soon deposited in the liquor, which, finally, form a mass; it is then decanted, and the product purified by numerous crystallizations in boiling water.

M. Schlieper considers it preferable to employ a mixture of chlorate of potassa and hydrochloric acid.

Alloxane separates itself from its solutions under the form of crystals, which sometimes acquire a very considerable bulk. When this product separates on cooling from a hot saturated solution, very large crystals are obtained, which contain 8 equivalents of water of crystallisation, and rapidly effloresce in the air. The crystals which form in a warm solution contain only 2 equivalents of water, and do not effloresce. The first crystals are prisms, with a rectangular base; the second are rhomboidal octahedrons.

Alloxane is very soluble in water; it reddens vegetable colours, and stains the skin purple, imparting to it a nauseous odour. Alloxane combines with the bases; but when we attempt to separate it from its combinations, we obtain an acid body, which differs from it by the fixation of two equivalents of water. A warm solution of alloxane gives, with baryta-water, a precipitate of *alloxanate* of that base. Boiling the latter for some time in the liquor, it resolves into urea and *mesoxalate of baryta*.

By ebullition with peroxide of lead, alloxane is decomposed, disengaging pure carbonic acid; a precipitate of oxalate of lead is obtained, while the liquid holds urea in solution.

Hydrosulphuric acid passed through a solution of alloxane decomposes it—sulphur is deposited, and a substance is obtained to which the name of *alloxantine* is given, which separates into crystals so abundant that the liquid becomes a thick *bouillie*. The formation of alloxantine is explained by the following equation:—

$$2\,(\underbrace{C_8H_2N_2O_8}_{\text{Alloxane.}}) + 2\,SH = \underbrace{C_{16}H_4N_4O_{14}}_{\text{Alloxantine.}} + 2\,HO + 2\,S.$$

The same product is obtained by placing granulated zinc in a solution of alloxane, acidulated with hydrochloric acid, or by adding to it protochloride of tin. This alloxantine is, in its turn, converted into alloxane under the influence of oxydising agents.

When a great excess of hydrosulphuric acid is made to act upon alloxane, this substance becomes acid; sulphur is deposited, and a product is obtained to which the name of *dialuric acid* is given.

When we act upon alloxane with sulphurous acid and ammonia at the same time, thionuric acid is obtained, by its ebullition with ammonia, a yellowish gelatinous matter, containing a salt, the acid of which is named *mycomelinic acid*.

By long contact with nitric acid, alloxane is transformed into *parabanic acid*.

The composition of alloxane is expressed by the formula,

$$C_8H_2N_2O_8.$$

WET AND DRY COLLODION.*

BY M. L'ABBE DESPRATS.

THIS is a very hard necessity, and it is the more to be regretted, inasmuch as many of the collodions which are not too old flow admirably over the glass plate; and, on the other hand, they give a very uniform and strong impression, perfectly harmonious in detail and chiar-oscuro. Thus, in operating with such collodions, the result will be just what we desire, provided we give a sufficiently long exposure; only, as stated above, the proof, when dried—instead of remaining a solid uniform film, as it does while wet—becomes riddled with holes, and disfigured with milky streaks and rings, from which a very uncertain, indefinite image results. These defects are not apparent while the proof is wet, and it is evident that they must be attributed to contraction of the film; if, therefore, we can prevent this contraction, we may yet save the proof. This we can easily do by means of a strong, syrupy solution of gum arabic. The proof, when finished and well drained, is placed on the developing-stand, and covered with a full layer of the gum-water; and, after a few minutes, the excess is poured off, and the plate placed on one corner to dry.

When dry, the film imprisoned by the gum cannot contract, and, therefore, remains as clear and continuous as when wet. By proceeding in this manner, we can always make use of collodion, which, without this precaution, would only uselessly encumber our laboratories. It is, of course, understood that, if we wish to give more stability to the proof, we can—after the coating of gum-water is dry—cover it with lac-varnish in the usual manner.

The uniformity of the layer on the glass plate being one of the strongest guarantees of complete success, it may not be inappropriate to devote a few lines to a subject regarded as very important by all who have treated of this subject. It is usual to recommend that an oscillating motion be given to the glass plate when pouring the excess of collodion back into the bottle. This motion is strictly necessary, as, without it, we should have a layer streaky in the direction the liquid flows. It is, therefore, easy to understand the importance of this movement, but it is seldom well performed. Operators are generally too much in a hurry; and, instead of giving a slight, undulatory movement to the plate, they most frequently proceed with jerks and rockings, so that the streaks, not having time to spread, remain as they are, and necessarily damage the picture obtained upon the plate. In this operation, therefore, it is necessary to proceed slowly and deliberately, with the eyes fixed steadily upon the glass. The latter being inclined at an angle upon the neck of the bottle, we seize the moment at which the last drops of collodion flow from it; at this moment—and not later—we bring the plate into a nearly vertical position, and, holding it suspended by the upper corner, opposite to that by which it was drained, we make it oscillate like a pendulum beating seconds, or even more slowly, and with a more extensive sweep. In this manner we give the streaks time to spread, and the excess of collodion is driven to the extremities of the plate, and the layer assumes a uniform thickness.

We have now a plate covered with a perfectly uniform film. Before immersing it in the sensitising bath, we must give the collodion time to *set*. But the question is, How much time? It is not possible to say precisely; it will depend upon the composition of the collodion, the size of the plate, and the temperature of the operating-room. This part of the process, therefore, is rather complicated. We may say that, generally, a collodion containing a large proportion of alcohol sets more slowly than one in which the ether is in excess of the alcohol; in very hot weather a collodion containing very little alcohol, and composed almost entirely of very strong ether, cannot be used; for one part of the film would become dry before the other portion was drained.

To avoid failure in this part of the process, it is very

* Continued from vol. iii., p. 322.

important to fully understand why we must wait for the collodion to become set before it is immersed in the sensitising bath, and why that time must not be exceeded. By immersing the plate in the bath before the collodion is set, the film is attacked, more or less, by the water of the bath; and it is, therefore, impossible to obtain a uniform proof. If it be delayed too long, the contrary effect takes place; the water of the bath—which, in the first place, breaks up the film—can now no longer penetrate it; the sensitising then amounts almost to nothing, and, consequently, no picture can be obtained, or, at least, nothing but an undecided one, which cannot be intensified. These very simple hints will, we believe, put every operator in a position to appreciate, even from his first attempts, the limits within which he must operate, in order to obtain what he has a right to expect from any collodion he may make use of. This point appears to us of great importance; and we believe we are guilty of no exaggeration in affirming that, upon this appreciation, more or less exact, depends in great measure the greater or lesser perfection of the proof.

(*To be continued.*)

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. S. BOURNE.

And now the ardent and enthusiastic amateur, having with much labour carefully prepared a good round number of plates, is anxious to start on his excursion. Before doing so, he should carefully examine his apparatus, to see there is nothing missing or out of repair. A good plan is to have a *list* of everything required, big and little, and, by consulting that when packing, he will be sure nothing is omitted.

I have heard of photographers who, when many miles on the road, have suddenly discovered that they have left that "trifle, the *lens*," behind; and it has frequently happened that focussing cloth or dark slide have been quietly resting at home when their presence was required "over the hills far away."

These precautions having been taken, he now, for a fortnight, bids farewell to business, its cares and anxieties, and sets off some bright morning in June or July, brimfull of hope and glad expectation, to visit some region of beauty or romantic grandeur—some famous spot which has long figured before his imagination—the object of his longing desire;—perhaps the wild mountains of Scotland, the picturesque valleys of Wales, or the sylvan "banks of the Wye." As he whirls along towards the scene of his destination, and looks out of the windows, Nature—robed in her most gorgeous dress, and smiling in sunshine—he fancies, is made only to minister to his enjoyments. His heart thrills with intensest pleasure when he remembers the delightful nature of his mission, and the sublime scenes he is about to visit.

Those who have never experienced them can form no conception of the feelings of a genuine photographer when he finds himself surrounded by scenes of beauty or grandeur. If he is a true lover of nature (which every photographer should be), he knows that not only, like the ordinary tourist, can he take his fill of that sublime enthusiasm which a magnificent landscape never fails to kindle in a poetic mind, but he feels that he can transfer to his delicate and mysterious tablets, with absolute truth and unerring pencil, every feature of the grand spectacle spread before him; constituting pictures which will ever possess the magic power of recalling and producing again the same unmingled pleasures he then enjoys, though, perhaps, removed hundreds of miles from the original and enchanting scene. He thus forgets his toil and his previous disappointments, and, resting with full confidence in a more hopeful and triumphant future, pictures to himself the transporting delight he will feel when, in the retirement of his own dim but much-loved apartment, he sees—starting up from the impressed tablets, as if instinct with life—the truthful and delicate images of those lovely and sequestered spots where, far from the busy haunts of men, amidst the tranquil scenes of nature, he has loved to roam and meditate.

There are few pleasures I know of equal to this. Let the frequenter of the ball or the billiard-room boast of enjoyments, and tell of the many happy hours he spends in the company of his merry and jolly companions; or he who thinks man's highest pleasure consists in moving in the gay circles of fashionable life, and frequenting the brilliant gatherings of polished society, dilate on the satisfaction *he* feels when on some occasion, and in some brilliantly-lighted and heated apartment, he takes part in what he is pleased to consider the most exalted and dignified employment (if such it can be called) in which it is possible for a human being to engage. But ask that true-born lover of the beautiful, who has succeeded in training Nature's own pencil to produce a likeness of herself—ask the genuine artist of the sun, when he finds himself face to face with the stupendous and lofty mountains, the rugged and romantic "passes," the lovely and picturesque valleys, the calm and tranquil lake, the verdant meadows and luxuriant woods, and with all the fairest and grandest of Nature's handiworks!—ask him, as he returns from his magnificent wanderings, laden with his precious burden, to his own apartment, to commence the work of bringing to view the latent impressions these scenes have themselves produced—ask him when that work is completed, and he beholds before him a complete panorama, painted by no hand of man, of every spot he has visited, possessing such marvellous truth and power, that he is able to visit them again, and that without the toil;—ask, I say, such a true-born poet and artist whether he would exchange the pleasures which such scenes and such employments afford him, for the more ambitious, yet more gilded and less solid, enjoyments which they seek whose aspirations or footsteps never wander beyond the scenes of revelry, mirth, and fashion. One answer only will he give. "No!" he exclaims; "feeling that the Maker of all things has implanted within me *chords* which the scenes of nature are calculated to wake to serenest and holiest harmonies, I envy not the restless votaries of fashionable indulgence the fickle pleasures of an inglorious career."

If I may be permitted to refer to my own experience, I can truly say that if, in my earlier attempts at photography, I spent many a sad hour and experienced many a bitter disappointment, I have since been amply repaid; and some of the happiest hours of my life have been spent in this fascinating pursuit. I shall not soon forget the pleasure and satisfaction I enjoyed when, in the summer of 1858, I visited that region of beauty and poetical renown—the Lake district of Cumberland and Westmoreland. It was on the 21st of June—such a day as we seldom see in this country, the atmosphere clear and calm, and the sun shining with unclouded brilliancy—that I stood on the walls of Lancaster Castle, and, looking across Morecombe Bay and the valley of the Sand, caught the first glimpse of the blue mountains which formed the scene of my destination. I was in the highest possible spirits, having a large number of plates with me which, I had good reason to hope, would turn out successful pictures, an almost certain prospect of fine weather, and a rich abundance of beautiful subjects, which would shortly crowd upon me. In a few hours, as the day wore on, I found myself rapidly nearing the spot of which I had read so much, and regarding which my expectations were now wound up to the highest pitch. It was half-past seven when I got to Oxenholme junction, from which a branch line carries you down to Windermere station, almost to the shores of the lake. Two or three other tourists were in the same carriage, and none of us could keep our seats, but were all striving to look out of the windows.

The sun was sinking behind the lofty peaks of Langdale,

* Continued from vol. iii. p. 335.

tinging their summits with the gorgeous hues of gold and purple, and filling the valley which intervened with a grand purple gloom, which, bounded by the dark masses of mountains standing out in bold relief against the clear sky, formed a scene of indescribable beauty and magnificence.

In a few minutes our attention was diverted by one of the gentlemen exclaiming, "There's the lake!" and at a considerable distance below us, reposing in tranquil beauty, we beheld for the first time, far-famed Windermere, studded with its little islands, and winding like a river, stretched far into the dim distance, bounded on the farther side by a lofty ridge of "fells," which cast a dark shadow on the unruffled water. A few minutes more, and we arrived at the station, and jumping on the "buss," were soon down at Bowness.

Having secured lodgings, &c., I went to a professional photographer, and begging the use of his dark room, developed two plates I had exposed at Lancaster, both of which turned out completely successful, which put me in better spirits than ever. I afterwards walked down to the margin of the lake; it was now growing dusk, and the calm serenity of the evening, the perfect quietude which reigned around—broken only by the dash of the oars of some boating party returning from a pleasure excursion on the lake, and the music of a flute which, played by one of them, re-echoed among the hills again and again, until it died imperceptibly on the ear—the huge dark forms of the mountains seen across and at the head of the lake—coupled at that moment with the consoling reflection, that for the next few days it was my *sole* business to linger among these scenes, for the purpose of transferring their images to the sensitive plates I had brought with me—altogether made an impression on my mind that will never be obliterated, and which, at the time, almost made me fancy that I was in faëry land, or that it must be a dream from which I should awake in the morning to find the enchantment gone.

However, on the morrow I was not disappointed; my expectations were not only fully realised, but surpassed. I began my work early, and so numerous were the views which presented themselves, that I went on exposing my plates without proper discrimination; the consequence of which was, I missed many I might have taken, and took some which I found afterwards were but very indifferent pictures. I spent a week in the district, visiting Ambleside, Rydal, Grasmere, Derwentwater, Ulleswater, &c., and a week of such mingled pleasure I never spent before; and had the photographs I took proved failures. the gratification I experienced in taking them, and the pleasure which the *anticipation* of their successful development afforded me, would still have been sufficient to cause me to remember the excursion with feelings of the most unequivocal delight. But I was extremely fortunate in the plates, for with the exception of a few which were under-exposed, *not one* proved a failure.

(*To be continued.*)

Dictionary of Photography.

MAGNESIUM.—One of the metals, the oxide of which is magnesia; the carbonate and sulphate of this oxide are used in medicine; the latter under the name of Epsom salts. Nitrate of magnesia is a very deliquescent salt, recommended as a preservative agent for collodion plates, by keeping the film moist during out-of-door operations. It enjoyed an ephemeral popularity, but was soon superseded by honey, glycerine, and oxymel.

Iodide of magnesium has been employed with success, in field photography, by Mr. Mayall. It is readily soluble, particularly in the presence of ammonia, and, being a powerful absorbent of moisture, prevents the decomposition of the sensitised collodion. He also uses the bromide of magnesium, which is even more deliquescent than the iodide; but the salts of this base are less sensitive to the action of light than those of potassium, cadmium, or ammonium.

MANIPULATION.—The manipulations in photography are identical with those employed in chemistry. They consist of dissolving solid substances in various liquids, of filtrations, crystallisations, &c., and must all be performed, as much as possible, in glass or porcelain vessels, for most of the substances used contain either free acids, or are metallic solutions which readily act upon other metals, or would be attacked and decomposed by the latter. Vessels of gutta percha are much used: gutta percha has the disadvantage of becoming softened by heat, and the essential oils readily attack it. The vessels indispensable to the art of photography are but few in number, consisting of funnels of various sizes, of glass and gutta percha, precipitating glasses, flasks for holding solutions, dishes of glass and porcelain; and a few small porcelain capsules, graduated measures, scales and weights, glass rods, a hydrometer, thermometer, and the usual apparatus required in chemical analysis, if the photographer's operations require it.

MARINE GLUE.—A useful cement for uniting surfaces of wood, glass, &c. It is said to be composed of shellac and caoutchouc.

MASTIC.—A resin obtained from the *Pistachia lentiscus*, a shrub growing in the Isle of Chio. The best kind is in small roundish oblong *tears*, of a pale yellow colour, transparent, dry, and brittle; hence, usually covered with a light white powder, resulting from attrition; it breaks with a vitreous fracture, and becomes soft and plastic when chewed, with a mild resinous taste, and an agreeable odour. It melts when heated, and burns at a higher temperature, diffusing an agreeable perfume. It is soluble in ether, but completely insoluble in water. In cold alcohol about nine-tenths of the resin dissolve, the remainder is soluble only in hot alcohol. Dissolved in spirits of turpentine, mastic forms a varnish. Although it has been recommended for varnishing negative photographs, it is not so good for that purpose as lac.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 20th March, 1860.

THE discovery of a new photographic salt will, I know, be hailed by you with pleasure. Since it has become habitual to tone photographic proofs with salts of gold, two compounds have been principally employed to this effect: the first is the ordinary commercial chloride of gold; the second, the well-known *sel d'or* of MM. Fordos and Gélis, which is nothing more than a crystallised *hyposulphite of gold and soda*. Many photographers are contented with applying directly a solution of chloride of gold; others prefer the "sel d'or;" but most of them find it too expensive, and are in the habit of taking commercial chloride of gold and mixing it with a certain quantity of hyposulphite of soda. This practice is, however, dangerous, for it is well known that chloride of gold cannot be obtained neutral; its solution is always acid, and, consequently, when mixed with hyposulphite, it will liberate sulphur, and so become prejudicial to photographic proofs. When gold is dissolved in aqua regia, and the solution properly evaporated, it deposits, on cooling, large yellowish crystals, which are not neutral chloride of gold, but which contain a large amount of free hydrochloric acid. If we endeavour to drive off the latter by heating the crystals, these soon decompose, and are transformed into protochloride of gold, which, on being dissolved in water, deposits metallic gold. To obviate these difficulties, M. Fordos has recently recommended the use of a salt not hitherto known in photography, namely, the double *chloride of gold and potassium*. This salt can be obtained in a perfectly neutral state; it crystallises easily, and the crystals formed are not deliquescent: it is, moreover, of easy

manipulation, and in no way injurious to photographic proofs.

In my first letter to the "PHOTOGRAPHIC NEWS" (8th of April, 1859), I remember having mentioned some curious facts relating to santonine, and its effects upon sight. This subject has been investigated, with some very interesting results, by Dr. A. de Martini, of Naples, Dr. Phipson, and M. Miahle, of Paris. The former has just published, in Italy, a new edition of his first paper upon the action of santonine upon vision. This new work is very much more complete, and contains an account of some experiments in which santonine was administered to persons suffering from an affection of the sight, the author hoping that cure would be the result. The subject of the first observation was a woman, 70 years of age, who had complained for some time of a weakness in the left eye; the pupil was larger and less sensitive than that of the right eye, and in the aqueous humour could be perceived a sort of white cloudiness. On the 10th of March, four to six grains of santonine were administered by Dr. A. de Martini. As usual, in such cases, the invalid soon perceived that the objects in the room appeared of an orange-yellow colour, even to the eye affected; from the 15th to the 18th of March, the medicine being continued and slightly increased, there was an evident amelioration in the sight of the left eye; external objects continued to appear yellow to both eyes, and the affection of the left eye was considerably diminished. The observations were continued till the 22nd of March, when the use of santonine was suspended, and the amelioration remained permanent. Two other observations were made upon male subjects, both troubled with an amaurotic affection. The result was, that the eyes became rather more sensitive to light, but no cure was effected any more than in the former case. Since Dr. Phipson has shown, by experiments upon himself, that the coloration of sight by santonine is owing simply to the solution in the blood of a yellow substance produced from this medicine, we cannot expect that any satisfactory results will follow the use of santonine for affections of the eye.

M. H. Caron has endeavoured for some time past to discover an easy method of preparing the metal calcium. He presented to the Academy of Sciences, last Monday, a method which, probably, realises his hopes. A mixture is made of 300 parts of melted and pulverised chloride of calcium, 400 parts of granular zinc, and 100 parts of sodium. The whole is heated in an ordinary furnace. If flames of zinc are seen to leave the crucible, the fire must be moderated. The grand thing is, to employ as high a temperature as possible; but, at the same time, to prevent the volatilisation of the zinc. When the operation is terminated, a metallic ingot is found at the bottom of the crucible; this is an alloy of calcium and zinc. It is placed in a charcoal crucible, and heated until all the zinc is volatilised. This is quite practicable, as calcium is not volatile. In this manner M. Caron has obtained as much as 40 grammes (32 grammes=1 oz. English) of calcium at a time. It generally contains a little iron, and, if commercial zinc has been used, lead, zinc, &c., also. It is, therefore, necessary to operate with pure, distilled zinc. The metal thus obtained is yellow, like brass, but soon loses its colour and metallic aspect when exposed to the air. It then becomes grey. It burns before the blow-pipe, but with difficulty, on account of the crust of lime which soon envelops it. When small fragments of it are burnt, they give out very fine red sparks; and, as no smoke or vapour is observed during this combustion, it is evident that calcium is not volatile, even at the heat produced by its combustion.

The author is about to extract strontium and barium by the same means; he has already produced alloys of these metals with zinc.

Dr. Hochstetter, who went out as naturalist in the scientific expedition of the Austrian ship *Novara* to the Australian coasts, has discovered—in the neighbourhood of the river Waikato—sources of boiling water, solfatara, and fumarotte very similar to those which are so celebrated in Iceland. He intends publishing in detail the results of his explorations.

Professor F. Pouchet, of Rouen, has just communicated to the Paris Academy of Sciences some interesting observations upon the microscopic bodies that falling snow sweeps down from the atmosphere. The snow examined fell on the 14th of February, and was collected from a high situation near Rouen; it was placed under a glass cover, and allowed to thaw. Here are the results of the microscopic observations which were made upon the surface of the snow, upon the surface of the water it gave on melting, and upon the corpuscles which had found their way to the bottom of the vessel.

In the first place, a great number of carbonaceous bodies, or *black smuts*, were observed, derived from the combustion of coal and wood. In the next, an extraordinary abundance of *grains of starch* from wheat, and one from the potato. They varied in size, and were all turned blue when touched with iodine. Some of the starch grains were met with already coloured blue, as if they had come in contact with iodine, in the atmosphere. Some minute fragments of a *green organic matter* were also observed, some of which were of an ovoid shape. Next, were seen some grains of *silica*, which were not very numerous, on account of the tranquillity of the air at the period these observations were made. Some minute granules of *carbonate of lime* were also noted. In the next place, two *eggs of infusoria*, two dead bodies of some large *parameciæ*, three *navicula*, three *bacillaria*, and two *bacteria;* and, after many hundred observations, nothing else that could be assimilated to eggs of animals or sporidæ of vegetables, were to be discovered. We must also note two fragments of the epiderm of some plants, two fragments of fibrous tissue, two filaments of white cotton, one grain of pollen, belonging to an *epilobium* or an *œnothera*, two spherical grains of pollen, the hair of a nettle, two other empty grains of pollen, an articulated filament, belonging probably to an *equisetum* (two sporidæ of *lycoperdon* on their filament?); all belonging to the vegetable world. The microscopic *debris* of animals, besides those already mentioned, consisted in three filaments of woollen—a red one, a yellow one, and a green one; and, finally, a very minute portion of the feather of a bird.

As it may well be imagined that a fall of snow would sweep the atmosphere from the clouds to the earth, and retain in its feathery crystals all bodies that are generally in suspension in the air, these observations point out, in a satisfactory manner, what these bodies consist of, and prove, from the excessive rarity of animal and vegetable germs, that the "spontaneous generation" of inferior plants and animals, in liquids, &c., abandoned to the atmosphere, cannot be explained by the assumption that the air itself is replete with germs of all description, &c., as has hitherto been professed.

This is the second or third time that M. Pouchet has brought forward facts to demonstrate the inconsistency of such an opinion.

To the Editor of the "PHOTOGRAPHIC NEWS."

Lausanne, en Suisse, March 15, 1860.

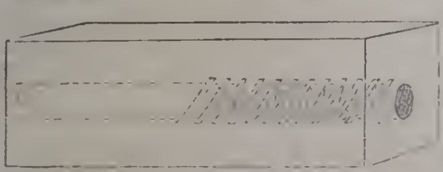
DEAR SIR,—Perhaps the following formula for a very simple paper negative process may be found useful to some of your readers. It is not much slower, if any, than the ordinary wax-paper processes; and the ease with which the sensitive paper is prepared must, I think, recommend it to beginners, and to others who do not require pictures possessing the sharpness of collodion. It seems almost impossible to fail with it. I inclose you the only bit of a negative I can find small enough to go into an envelope for single postage. Although it has been lying about among a lot of old papers for some eight months, it will show you that the whites of the picture are quite clear and bright, and that it has the ordinary sharpness, or want of sharpness, of paper negatives. It was taken with a Ross' stereo. single lens—exposure, two minutes—and was prepared several days before use. I have tried all sorts of French and English

papers, but I find only Hollingworth's thin negative paper worth anything for this particular formula:—

Iodising solution.—Simply 12 or 13 grains of pure iodine to an ounce of ordinary spirits of turpentine. A pint of spirits of turpentine, which is a convenient quantity to make, will take half an ounce of iodine.

This must not be mixed suddenly. Place the turpentine in a large wide-mouthed bottle, and add by gentle degrees the iodine. It will be of a very dark colour at first, but if kept in a dark place, and shaken or stirred up frequently for a day or two, it will clear, and become of a light olive-green colour. It is then fit to use. It is not needful to filter it—generally, the whole of the iodine is eventually dissolved. Pour the liquid into a flat glass dish, or cylindrical glass bottle, and place the papers, as usual, in the solution. Let them remain there some little time—half an hour, or more, does no harm. Pin them up to dry. They will keep a long time thus prepared. The rest of the process is exactly the same as with the wax-paper. Sensitise in the usual aceto-nitrate bath (saturated with iodide of silver); wash well in two waters; dry between blotting-paper; expose as for wax-paper; develop in gallo-nitrate of silver bath; fix with hypo.; dry, and then wax. I should be glad if any of your readers accustomed to work the paper processes would try this simple formula, and report thereon.

In some of your papers on the working gutta-percha into various articles in photographic manipulation, I did not see a gutta-percha developing-stand mentioned. And, indeed, I have never seen or heard of any but those I devised years ago for myself. If, then, they are a novelty, perhaps you would be glad of a description of them. In form, they are exactly like the ordinary brass triangular stands, but the whole is manufactured in gutta-percha. It is evidently easy enough to make the screw-holes through the flat strips forming the top triangle of the stand. You have only to twist a neat brass screw (slightly greased) through an orifice a little less than diameter of screw, the gutta-percha being *not quite* hard and cold. The way I devised for making the gutta-percha screw is thus: I turned an inside screw (technically termed a "female screw") in a piece of brass or other metal answering to the screw, with which I formed the holes in the flat upper strips of gutta-percha (those screws having rounded threads are, of course, the best). The piece of brass having the inside screw would be thus:



Now the interior is slightly greased, and the brass a *little* warmed, soften a rod of gutta-percha (just the size to pass into the hollow screw-hole); let it drop quickly, while quite soft, into the bottom of the screw-hole, and immediately plunge a rod of steel wire (very impending) through the centre of the gutta-percha rod to the bottom of the hole or cylinder. When the whole is cool, the rod of gutta-percha will turn out, by twisting the steel wire the proper way, quite easily. You have now a screw which will fit the holes in your triangular stand, and you can cut away any projecting bits, make it look neat, and join by heat, if necessary, a bit of gutta-percha to the screw by which to twist it. Of course solid screws might be made, and are, no doubt, made, by sawing the piece of brass into two parts, like a bullet-mould, and making a solid screw by pressing a rod of soft gutta-percha between the two halves. But perhaps the above way may be inconvenient in some hands. It is of no consequence that the screw is hollow; it is as stiff and unyielding as if it were solid—perhaps more so. If these "dodges" are of any service to you, pray make any use of them you please.

I am, dear Sir, yours very truly,

J. Lawson Sisson.

P.S. I need not say what advantages such stands possess over brass ones. The screws in brass are soon dissolved away by the acids used; and many a picture has been spoilt by solutions (decomposed by the metal) running round and spreading over the collodion film.

Proceedings of Societies.

Blackheath Photographic Society.

The twenty-third ordinary meeting of this society was held on the 19th instant, at the Golf Club House, Blackheath, the president, J. Glaisher, Esq., F.R.S., in the chair. The minutes of the last meeting having been read and confirmed,

Mr. Charles J. Busk proceeded to read a paper

On the reproduction of engravings, prints, ordinary writings, or letterpress, on prepared papers by contact in the dark.

The pictures shown this evening are the result of a process I discovered about twenty years since, by which engravings, prints, letterpress, or writing with common ink, may be copied on prepared paper by contact with it in the dark.

The image, at first invisible, will be developed as a negative, by holding the paper by itself for a short time in bright sunlight. A few seconds suffices in some instances, but a longer exposure is requisite when the sun is not bright.

I am unable to fix with minute accuracy the date of this discovery, but it was in the year 1840. I was then residing at the Cape of Good Hope, and in the course of that year used occasionally to prepare papers with salt and nitrate of silver, according to formulas given in some of the periodicals of that time, for the purpose of copying leaves of plants, &c. This was done overnight, and the papers were then placed between the leaves of books to preserve them till the morning.

On one occasion, in order to vary the experiment and try something new, I steeped some paper in a solution of tartaric acid (about a tea-spoonful to a tumbler of water), instead of in the salt solution, and, after being dried, it was immersed in a solution of nitrate of silver (60 grains to the ounce of water), again dried, and placed as usual in a book. On exposing it next morning to a bright sunlight, instead of an image of the object placed on it to be copied, I was greatly surprised to see a totally different picture appear, as if by magic.

Ultimately, on reference to the book in which the paper had lain during the night, I found I had obtained a negative copy of the picture it had been in contact with. Struck by the singularity and unexpected result to this my earliest original experiment in photography, I prepared other papers in a similar manner, and was equally successful with them. I recollect one in particular. On a half-sheet of foolscap I obtained a very distinct copy of the "Warwick Vase," from an engraving in the *Saturday Magazine* (I think it was called), a periodical of that day. The copy was very clear and well defined, and of a tolerably dark reddish slate colour. This picture was shown to many persons, and was in existence for some months; what became of it at last I do not know. It was not fixed, otherwise than by simple washing in water, and did not seem to lose distinctness during the time I recollect it.

Only practising photography as an occasional amusement in this most simple way, it did not occur to me to take any steps to bring the matter to the knowledge of scientific persons, and in the course of a short time I ceased to make further experiments, but not till I had ascertained that oxalic, citric, and some other acids produced similar effects.

Since I have been in England, during the last ten or twelve years, this experiment has been only occasionally spoken of, and a few repetitions made with tartaric acid to show the effects.

Within the last month, however, I have been urged by our president, Mr. Glaisher, and by Mr. Heisch, a member of this Society, to bring this discovery to public notice, as it might probably be made available for some useful purpose.

The experiments I have made of late, though still incomplete, show very interesting and satisfactory results. I hope that others may feel inclined to investigate the subject also, with a view of eventually bringing it to practical use. From what I have done, I think it very probable negatives can be produced that will allow good positives to be printed from them.

Until lately, I imagined that an organic acid was a requisite ingredient to use in preparing the papers, for my earlier trials with inorganic acids were not successful; but more careful experiments of late show that, so far as I have used them, they answer equally well; and I have also found that paper dipped in a solution of nitrate of silver alone will, after a few hours' contact with an engraving or print, give a faint image in bright sunlight (probably in consequence of a little free acid in the nitrate of silver solution), and even if the image should not appear after a few minutes' exposure, it can be developed by pyrogallic acid, 1 grain to the ounce of water, with a few drops of nitrate of silver solution added; but the effect thus produced is different to that, when it is developed by sunlight alone. The image comes out of a different shade of colour to the rest of the paper, and changes to a white metallic lustre, whilst the ground turns to a dense black.

In order to produce good effects with distinct whites, it is requisite, and the main feature of my process, to steep the paper in an

acid solution. Different acids give slight differences in the clearness of the whites. Glacial acetic acid I have found to produce the very best whites, and it also insures uniformity of colour on the dark parts.

The twenty-six pictures, measuring 6in. by 8, before you are the best I have been able to make within the last few days—the weather has not been particularly favourable for developing the image.

Each picture has attached to it the formula according to which the paper was prepared. They were nine hours in contact with the engravings, &c., to be copied. Not, be it understood, that such a length of time of contact is requisite, but simply because it was convenient to prepare the papers overnight and leave them on the engravings till the morning. Half-an-hour or an hour is long enough, and probably much less time will do. I have obtained a picture after five minutes' contact, and which, after contact, but before exposure to sunlight, was placed between sheets of blank white paper for a day and a half; it then developed as perfectly as those longer in contact, and exposed to sunlight immediately after removal from the original. Two of the specimens on the table, marked S P, 111 and 112, were nine hours in contact, and then twenty hours between blank papers. No difference in distinctness of image or clearness of whites can be distinguished between them and the others.

They, and many of the other pictures, have been taken from engravings in the *Art Union Journal*, representing articles at the Great Exhibition of 1851. One is from a coloured example of Minton's tiles, in the September number of that year, and shows the curious effects of different colours—blues producing yellow, and reds and yellows producing whites, more or less clear. Others are from engravings and letterpress in different books. There are specimens from manuscript writings of the year 1845, and one from a machine-pressed copy of a letter written June 6th, 1848, as can be read on inspection.

It is not at all necessary to expose to sun or day-light any of the prints or writings, or other designs to be copied, before putting the prepared papers in contact with them. A design that has not seen day-light for years, can be taken equally well, and in as short a time. Some of the pictures are on Turner's negative paper, and some on Saxe paper; both negative and positive. Some of the papers have a distinct picture on either side; some on one side only, intended for use as negatives to print from, the white back being obtained by placing a piece of black transfer paper in contact with it. A long exposure to the sun-light has not had the least deteriorating influence on the whiteness when glacial acetic acid has been used in the nitrate of silver solution, and applied on both sides of the paper.

This change produced in the prepared papers by their merely having been in contact for a short time with black and some other colours, and which prevents discoloration on exposure to sunlight, is exceedingly curious. Perhaps some one more experienced than myself in photographic chemistry may be able to explain the nature of the chemical action that produces this singular result. The papers have been nearly all wetted on both sides, with the two solutions used in preparing them. The proportions of the ingredients used have been varied for experimental purposes. The acidifying, or first solution, in which the paper is first steeped, has been for some of them 80 grains tartaric acid to the ounce of water; for some, 80 grains tartaric acid, with a drachm of glacial acetic acid added; for some, 20 grains tartaric acid, and half a drachm glacial acetic; for some, 50 grains tartaric acid alone; and for others, 1 ounce glacial acetic acid by measure, in 2 ounces of water, without tartaric acid.

For the sensitising, or nitrate of silver solution, I have used, for some, 50 grains of nitrate of silver; for some, 60 grains; and others, 90 grains, to the ounce of water; for some, the above proportions of nitrate of silver solution alone; for others, in combination with glacial acetic acid, from half a drachm to one drachm in the above proportion of nitrate of silver in an ounce of water.

These various proportions give slightly different shades of colours to the negatives, and the shade of colour is also in some degree affected by the nature of the size in the papers, those sized with gelatine being rather redder than those sized with starch.

Of the various mixtures I have used, I am inclined to think that the following proportions will give the best results, and should be applied to both sides of the papers:—

For the first, or acid bath—Eighty grains of tartaric acid to an ounce of water. The paper to be immersed for a short time, and then dried by moderate heat; then well wetted on both sides, or immersed in a solution of nitrate of silver, 50 grains to the ounce of water (or not more than 60 grains at most), to which half a drachm or one drachm of glacial acetic acid has been added.

Or the acidifying solution may be 20 grains tartaric acid, with half a drachm glacial acetic to the ounce of water, or 1 ounce of liquid glacial acetic acid, mixed with 2 to 3 ounces water; the sensitising, or nitrate of silver solution, being, as above mentioned, 50 to 60 grains to the ounce, with a drachm of glacial acetic added. Nitric acid, one drachm in an ounce of water, is an acidifying solution, that also gives good images.

The sharpness of definition and the whites in these negative pictures being so good, the only desirable point still to attain is to give greater intensity to the dark parts. With this object in view, I am still experimenting, and with good hope of succeeding shortly. It will then give me pleasure to communicate the result with particulars to this Society.

Before I conclude, I may say that within a recent period I have seen mention made in the "Year-Book of Facts for 1858," pages 208, 209, of some experiments by the celebrated photographer, M. Niépce, in that year, of a somewhat similar nature to mine. He used ordinary sensitive paper, but could obtain only a faint image after placing it in contact with an engraving or design, *which it was indispensable should itself have been exposed for some time to strong sunlight.* The discovery of my process was eighteen years prior to this, and by it the exposing of the engraving or design to be copied, to the light in the first instance, is not at all necessary, however long they may previously have been in the dark; and the image produced is almost all that can be desired in a negative.

I do not think that by using ordinary sensitive papers good negatives with clear whites can be produced, but consider the employment of acids in the preparation of the papers to be indispensable in order to obtain them.

At the conclusion of Mr. Busk's communication, a vote of thanks was cordially tendered him.

The President then said: You are aware that the Collodion Committee appointed by the London Photographic Society has made its report. I have read the report with some surprise, and, as I think it is the duty of Societies like our own to do all in their power to prevent those who are looked upon by the public as photographic guides from leading them astray, I shall call on Mr. Heisch to make remarks on that report.

Mr. Heisch said: Sir, in March, 1859, the Photographic Society of London appointed a Committee to examine collodions with a view, as stated in the report before us, of arriving at a definite formula.

The report of that committee was to have been discussed at the last meeting of the Society. All who were present will remember how abruptly the discussion was concluded. It was not, however, to comment on this subject, nor on the strange position in which a Society places itself by appointing a committee to examine and report on an important subject, and, when that committee makes its report, neither adopting, rejecting, or even discussing its recommendations, that I now come forward. Had the committee confined itself to matters in which only the Society appointing it were concerned, I would not have been the one to meddle in other men's matters. I should not have said one word to-night did I not feel that a great injustice has been done to the public in general, and the manufacturers of collodion in particular, by the wording of this report. I acquit individual members of that committee of any intentional injustice; but that injustice has been done, I fearlessly assert.

Sir, the report of the committee states that the collodion made by Mr. Hardwich is, "in regard to sensitiveness, unsurpassed;" that "it is of superior excellence;" and they "confidently recommend the Society to stamp it with the full mark of its approbation." Sir, if these words mean anything, they mean that, in the opinion of the committee, this collodion is more sensitive, and altogether better than any in the market.

Now, sir, there are hundreds of people who have neither time nor inclination to examine various samples of collodion for themselves, who will receive this as an authoritative judgment, and will not even take the trouble to examine the report and find out—what would surprise any one who reads the words quoted—that the collodion in question was never compared with any other, and, moreover, that the facts concerning its working properties detailed in the report, form but a very slender foundation for such unqualified praise. Makers of collodion will naturally feel delicate in protesting against this report, and it is on that account that I feel that we, who are neither makers nor vendors of collodion, ought to come forward and protest against a Society, supposed to be the leading photographic association in England, putting it into the power of any tradesman to use its name in proclaiming the superiority of the article he sells, more particularly when we consider that the article in question has not been compared with that of other makers.

I will now say a few words on the report itself, to justify the observations I have made.

First, we are told that the collodion "is comparatively, if not entirely, free from glutinosity, crapy lines, contractility, and other defects of film met with some years back." Now, sir, I

would ask, with what has it been compared? Certainly not with any of the first-class collodions in the market, many of which are *entirely* free from any of these defects. Next we are told that it "*sometimes* contains too much soluble cotton for large plates, and *occasionally* requires thinning down in hot weather." These words "sometimes" and "occasionally," are very significant, showing, as they do, that the collodion is not always alike.

Another proof of the want of uniformity is that Mr. Fenton states that on using some of the earlier samples of the collodion, he was obliged to roughen the edges of his largest plates to prevent the film from curling off, but that with subsequent samples it was unnecessary. Were these later samples made according to the formula originally sent to the committee? If so, it is clear its results are not always uniform; if not, it cannot be the same collodion.

Next we are told of a tendency to irregular drying. This, however, is said to be inconvenient, but not insuperable. We come next to sensibility, which, we are told, is, in the opinion of the majority, unsurpassed. To justify this expression, it should have been compared under the same conditions with every other collodion, which there is no pretence even that it was by the majority; while the only member of the committee who compared it with any other, found that it took double the time. An attempt is made to explain this by the fact of his using a weak developer; but as we may fairly presume he used the same for both collodions, the explanation is far from satisfactory. Mr. Frith's private letters are here pressed into the service, but will not do much towards proving the unsurpassed sensibility of this collodion with those who have seen the instantaneous pictures of Mr. Lake Price, and others, taken with other collodion, not in the clear light of Cairo (which contains, according to the careful experiments of Bunsen and Roscoe, more chemical rays than the light in any other part of the world yet examined), but in London—not on $4\frac{1}{4}$-inch, but on 12-inch plates. With regard to keeping properties, unless iodised with cadmium, it loses its sensibility in two or three days, in warm weather—no slight defect, in most people's opinion.

In speaking of the gradation of tone in the pictures produced by the collodion, after many rather contradictory remarks, the committee conclude that it is "sufficiently good." Sufficiently good—for what purpose?

One gentleman next speaks of transparent spots, with tails, and two or three of fine blacks—curious defects in a collodion to be stamped as of superior excellence by the Photographic Society.

One point mentioned by Mr. Fenton strikes me as very remarkable—viz., that when used with the addition of bromide, it will not bear the least over-exposure. With all collodions which I have tried, bromides enable them to bear a much greater amount of exposure, without injury.

I cannot but remark, that though three formulæ were sent, not one word is said of two of them; and the gentleman charged with examining them only says he assisted at the preparation of Mr. Hardwich's, but does not tell us if he succeeded in preparing it without that gentleman's assistance. Now, sir, let me sum up the facts of the report:—

1. The film is not quite structureless.
2. Its properties are not quite uniform.
3. When compared with other collodion, it was not so sensitive.
4. It has no keeping properties, unless iodised with cadmium.
5. There are complaints of transparent spots and dark lines.
6. When bromised, it soon solarises.

Yet this collodion is to be stamped with the approbation of the London Photographic Society as of superior excellence and unsurpassed sensibility. If I could believe such a thing possible, I should be inclined to say that the committee must have furnished the facts, while some other individual has drawn the conclusions.

I beg to have it understood that I offer no opinion on the merits of Mr. Hardwich's collodion—I point out only the discrepancies of the report.

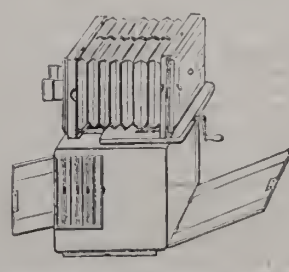
I am perfectly aware that much of what seems so strange may be capable of explanation; and I have made the strong remarks I utter to-night, partly with a view of giving the Committee that opportunity of explanation which was denied them at their own Society. The injustice to other makers cannot be explained away, and it is against this that I wish our Society to protest; but the unfavourable impression so commonly—I may say, universally—entertained of the report itself, may, I trust, be at least partially removed. At the same time, I cannot but remark that Mr. Hardwich's letter, published in the last number of the *Photographic Journal*, will rather increase than diminish that unfavourable impression. Mr. Hardwich puts himself forward as champion of the report, forgetting that he is not one of those who signed it, and is therefore not answerable for its contents, and forgetting, also, that he is the manufacturer of the article which is reported on.

After some remarks to the same effect from other members of the Society, Mr. H. WILLIAMS proposed and Mr. J. SOUTH seconded this resolution, which was carried unanimously: "That the remarks of Mr. Heisch be adopted, as expressing the opinion of the Society." The meeting then adjourned.

New Photographic Apparatus.

HARE'S PORTABLE BINOCULAR CAMERA.

AT the last meeting of the North London Photographic Society, Mr. Hare exhibited a portable binocular camera, constructed as follows:—The body part is formed on the bellows principle, and is worked by means of a screw. Any focus can be obtained from $2\frac{1}{4}$ to $7\frac{1}{4}$. The camera, with 3 double and 1 single back, and screw, packs in a mahogany case $8\frac{3}{4}$, 6 by $5\frac{3}{4}$



outside measurement, and the weight of the whole is 5 lbs. The case is capable of being fixed on the tripod stand, and, when the camera is thus arranged, freedom of motion is obtained.

Photographic Notes and Queries.

THE APLANATIC LENS.

SIR,—That portion of Mr. Bourne's paper, published in your last number, which relates to the choice of lenses, I apprehend to be not quite consistent with the present state of our information relative to this important part of a photographer's apparatus. Under such impression, Mr. Bourne will perhaps excuse my making a few observations.

Mr. B. evidently recommends the photographer to provide (irrespective of portrait work) two kinds of lenses: one for landscape work, the other for architectural. For landscape work, he thinks that none surpasses the old single achromatic form; for architecture, Mr. B. truly states, what is very desirable, viz., that the lens "should have a large angle of view, and give straight marginal lines." To this may be added—combined with adequate distinctness.

Now, it is clear that neither a large angle of view nor straight marginal lines are any objection (if present) in a landscape lens; and, therefore, Mr. B.'s recommendation to procure a special lens for landscapes, must arise from his considering that there is present in those forms which he proposes, as fitted for architectural purposes, *some other quality* which renders neither the periscopic, the Petzval, nor the orthoscopic, as well fitted for landscapes as the single combination. In this I quite agree with Mr. B. and I believe that the same view is held by photographers generally.

That wherein I am obliged to differ in opinion with Mr. B., is as follows:—Two out of the three forms which he recommends the photographer to select from (where straight lines and large angular field are desired) are, I believe, as yet incapable of supplying these requisites. What does the Scotch Committee say on this head? All the Petzvals and orthoscopics which they examined gave distortion, and apparently in about the same quantity as some of the single combinations; the only diffinity in the lines being concave for convex outwardly; while the photographic journals occasionally contain (from some one who speaks generally

in favour of the orthoscopic form) a regret that its angular field is small. Some time since I procured several of these lenses, the work of the best makers, and have retained the best. Its distortion is so similar in amount to that of the patent aplanatic lens that, after several careful comparisons, I find it impossible to say which has the advantage in this respect. I therefore hold, until convinced of the contrary, that if it be required to render marginal lines strictly straight, we must have recourse to some form of lens whose qualities, in other respects, have yet to be determined. It is very easy to form a combination with straight marginal lines, provided we forego other important conditions.

I believe that the reason of the Petzval or orthoscopic form being generally considered to have *but little* distortion is, its field of view being comparatively small; the distortion is, in consequence, not striking *for that field*. (The distortion of any lens increases in a high ratio with any increase of the field.) And if the photographer be only content, in a few special cases, to restrict his angle of view to that for which the Petzval lens or orthoscopic lens is adapted, he will find, in the aplanatic lens, a servant of all work, equal to the other for architectural subjects, and superior to it, and to other combinations, for all other work (portraiture, of course, excepted).

If I be correct in these conclusions, the photographer may well begin with one kind of lens only (viz., the aplanatic) for all out-of-door work; and, if he only use that one kind judiciously—that is to say, keeping within the angle of view of the Petzval form, and keeping his camera level where it is desirable to keep down distortion—I believe he will not find a necessity for any other form of lens, though he may find it useful to have a second lens of the same form, but differing in focus. THOMAS GRUBB.

Dublin, March 12, 1860.

PRINTING BY DEVELOPMENT.

SIR,—I am sorry that I have not been able to reply to the inquiries of "Grateful" before this time; but I am now glad to answer him and give him my experience.

As to Mr. Wentworth Scott's printing process, as given in vol. ii. of the "NEWS," I must say that it was never a favourite of mine. I have not the slightest doubt of its results being really good, but I think it has also some disadvantages. In the first place, there are some ingredients without whose action, I think, any photographic print would be much more certain of permanency; and again, the whole process is comparatively an intricate and troublesome one, without any adequate returns. My belief is, that the most simply-produced prints are, at least, the most permanent; the only question being—*are they equal in beauty to those gained by more intricate methods?* In reply to this, if we appeal to the editors of the different journals, and the reviews of the exhibited pictures, &c., we are forced to admit that no process gives *better* prints than the simple albumenised paper, toned by the alkaline chloride of gold. Of course, as I have before stated, I am not affirming that other processes do not give *equal* results.

The paper prepared for printing by development, as inserted in the "NEWS," vol. ii. p. 49, is not suitable for use in the camera for many reasons, nor is it at all necessary that it should be rendered so. If "Grateful" will refer to No. 49 of the *Journal of the Photographic Society*, he will find a description of the negative paper processes, by Mr. Long, the first of which is as *simple* and *cheap* as the positive process, and will give him first-rate results. Or, if he prefers the calotype in its original form, and *is really clean* in his manipulations, he will find boldness and cheapness there also. When pictures not less than 12 × 10 are wanted, my own opinion is, that for one class of studies, no process gives results equal in boldness, and an indescribable *texture* effect to dry paper. As a sample, let him examine "Turner's Cottages," "Old Oaks," &c.; and these are all from calotype negatives.

Should "Grateful" wish for my experience, I shall be glad to give it him through your journal. Θ

SILVER RESIDUES—CARD MOUNTS.

SIR,—Having noticed an article in the "NEWS" thus headed, we beg to inform "J. W." that we shall be happy to comply with his wishes, and likewise furnish him with all he may require in photography. For further particulars we must refer him to our advertisement in this paper. HOPE AND CO.

THE FOTHERGILL PROCESS.

SIR,—In the "PHOTOGRAPHIC NEWS" of the 9th inst., p. 330, I find my note commending the keeping qualities of Fothergill's plates ascribed to one "C. Wilton."

As this is evidently a mistake, and may lead to disappointment, should a member of the club forward prints addressed to one unknown in Freemantle, I consider it prudent to acquaint you with it for correction.—I remain, Sir, yours very truly,

Freemantle, Southampton. LOUIS D'ELBOUX.

[*** The error arose from the indistinctness of our correspondent's signature.]

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Tuesday,	Mar.	27	—Birmingham Photographic Society.
Wednesday,	,,	28	—North London Photographic Society,—Annual Meeting.
Friday,	,,	30	—Photographic Society of Ireland.
Tuesday,	April	3	—London Photographic Society.
Wednesday,	,,	4	—Manchester Photographic Society.
Thursday,	,,	5	—Belfast Photographic Society.
Tuesday,	,,	10	—Photographic Society of Scotland.
Wednesday,	,,	11	—Chorlton Photographic Society.
Friday,	,,	13	—Norwich Photographic Society.

TO CORRESPONDENTS.

*** *"The Amateur Mechanic" and some other communications are in type, and will appear in our next impression.*

ERRATUM.—The diagram *a*, in page 333, in the number of last week, was erroneously printed. It should have been reversed.

H.—1. On the smooth side. 2. Bind them together with very thin sheet lead, such as tea is packed in; or glue slips of muslin round the edges with lac cement. 3. The sheet to be copied must be placed exactly vertical, so that the light is not reflected from the surface, and the negative must be intensified with bi-chloride of mercury and hydrosulphate of ammonia. 4. The exhausted toning-bath contains little or nothing of value; mix it with the other residues.

A. R. P.—You must have read the "NEWS" very superficially, or not acted upon the instructions given with due care. Other readers succeed admirably with what you fail in. 1. A wrong formula; see No. 57 of the "NEWS." 2. The colour is applied dry, in powder. 3. Varnish first. 4. See No. 57 of the "NEWS."

J. G. (Donegal.)—Add dried pearlash, and decant the supernatant spirit. Repeat this operation so long as the pearlash dissolves; in this way you will get very strong spirit. Put it in a wide-mouthed jar, covered tightly with bladder, and place the jar in the sunshine, or a warm room, and in due time you will get absolute alcohol.

L. D.—Portraits can be taken at night by the aid of Moule's photogen. You must separate the portions of your compound portrait lens, and use the back lens with a small stop in front. The lens you propose, if it will accomplish what you claim for it, cannot fail to be well received. We should like to see a specimen of what it will do.

No. 35.—We have received several complaints similar to yours, and must, therefore, conclude that the formulæ are not practicable. We will examine into the matter. Perhaps if the toning bath were warmed up to 65° a better result would be obtained.

T. (Manchester.)—You are wrong in supposing that the argentometer denotes the specific gravity of a silver solution. The method of testing you propose is that in which the argentometer is employed. Salt of tartar is impure carbonate of potash. Pearlash is the same—purified.

W. L.—1. If you wash the prints before putting them into the solution of salt, no spots ought to appear, unless the salt is contaminated with impurities. 2. The deposit is doubtless chloride of silver; the nitric acid may be impure, or the utensils you employ.

O. G.—If the focus you have given is that of the double combination, it is a very long one, but not too long for landscapes. You may have a camera made for it.

AN ORIGINAL SUBSCRIBER.—It would be premature to do as you desire with reference to the articles referred to. In due season full explanations and references will be given.

W. G.—You can make a solar camera with the lenses you describe, and sell your pictures without infringing any patent. (See "PHOTOGRAPHIC NEWS," No. 75.)

S. G. (Brighton.)—It is assumed that the copyright law protecting engravings applies also to photographs; but as the question has not yet been tried, it is impossible to say what the decision of the Court would be.

R. H.—Mix with the solution some fine dry washed silver sand and ivory black; shake well together; then, when clear, decant or filter.

W. G. P.—It is usual to insert a wire frame-work at every fold, else the bellows is liable to collapse: examine a concertina or accordion bellows.

PHOSPHOR.—The lime light and the Fitzmaurice light are, we believe, identical in principle; they may differ in details of manipulation.

A. W. W.—Develop with protosulphate of iron, and afterwards strengthen with pyrogallic acid.

H. R.—Very excellent results may be obtained with dry wax paper. See the Rev. J. Lawson Sisson's communication in the present number.

FADING AWAY.—The philosophy of fixing positives is well explained in MM. Davanne and Girard's papers published in the "NEWS."

LENS.—There is no stereoscopic effect, because the pictures are incorrectly placed. They should be reversed.

L. L.—We have found "Collodion Adolphe" as good as any, and cheaper than most others.

Q.—Your bath is doubtless alkaline. Immerse a piece of litmus paper, and watch the result.

SEL D'OR.—Chloride of gold is not so safe as sel d'or.

H. H.—Add fresh crystals of hypo. to every batch of proofs put into the bath.

DELTA.—There is no difference between "glacial" and crystallisable acetic acid

STAR.—A twin lens camera is preferable.

PYRO.—One of Griffin's gas furnaces of the size you require costs about £8.

ALMA.—Use Marion's helio-velin paper, which possesses a very fine surface.

NEMO.—The present price of aluminium is about 8s. per ounce.

EOTHEN.—See vol. i. p. 44.

EXCELSIOR.—Your baths appear to be too weak, both the silver and the gold.

M. B. (Sidmouth.)—Reply in our next.

LAC.—Nitrate of silver solution does not act upon lac-varnish.

BION.—Prussiate of potash is not bichromate of potassa.

WALSALL.—Such an outfit as you require may be obtained for about £5.

*** All editorial communications should be addressed to Messrs. CASSELL PETTER, and GALPIN, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 82.—March 30, 1860.

ON COMPOSITION AND CHIAR-OSCURO.—VII.

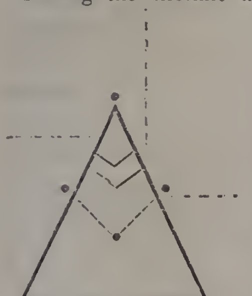
BY MR. LAKE PRICE.

"The excellence of portrait painting, and, we may add, even the likeness, the character, and countenance, as I have observed, in another place, depend more upon the general effect produced by the painter than on the exact expression of the peculiarities, or minute discrimination of the parts."—Sir Joshua Reynolds.

Portraiture is a branch of art which, since the revival, has in all countries justly enjoyed a large popularity; by its means not only are the domestic affections gratified, but it also bestows the more general benefit of handing down to posterity the resemblances of the great, the talented, and the good of times past. The regret we often hear expressed, that the nullity of art during the middle ages should have left us no vestige of the semblance of the historical personages of the period, sufficiently proves the interest and utility which attach to the delineation of the human form and countenance in portraiture. Our own nation has pre-eminently been characterised for its tendency to appreciate and patronise this branch of art, which, commencing with Holbein, was continually encouraged in the practice of both foreign and national painters; but it has been reserved to our own time to witness, in the discovery of photography, the extreme popularisation of portraiture, by the only means which could have ministered so largely to the feeling of the masses.

In portraiture, the lapse of nearly four centuries has handed down to us comparatively few culminating excellencies whereon to form our taste and base our judgment of what qualities good portrait painting should consist. The frivolities of fashion, and requirements of injudicious patrons, have led from the true path many artists, and consigned them to an oblivion which the unbiassed verdict of succeeding generations is sure to pronounce on all portraits in which, instead of steadfastly holding to the true principles of art and simplicity of nature, the painter has only pandered to the futilities of ephemeral conventionalities.*

During the lifetime and immediately after the decease of a great painter, there appears to be a vacillation in the true estimate of his talents by his contemporaries, who often place his merits either above or below the point at which later and more unbiassed posterity esteems them. It has been the fashion of late rather to depreciate the talent of Lawrence; but we may be sure, in spite of some mannerism in his treatment, that the painter of the noble portraits of Cardinal Gonsalvi, Pius VII., Miss Croker, Mrs. Peel, the Calmady Children, the Countess Gower, &c. &c., must always be looked upon as one of the greatest of portrait painters, and our readers will derive much benefit by the study of his works through the numerous engravings from them. We often see, in his female portraits, the principle which appears in the diagram *a*, namely, the pyramidic form given by the outward lines of the dress, whilst the bust and arms furnish the opposing downward lines, the *straight* perpendicular being given by architecture, and the horizontals by accessories. In the picture below (the portrait of the Countess Gower and her child), the *contrasting* turn of the heads composes well with each other; whilst the *movement* of the child's attitude gives animation and nature to the subject. The costume of Lawrence's time did not offer the same difficulties for the portrait painter to overcome as the monstrous powdered head-gear, hoops, furbelows, &c. must have been to Sir Joshua; yet we always see both *generalising* the coiffure and dress of their sitters, not dwelling upon minor frivolities, but treating their subject in a broad and tasteful manner, which softens down the eccentricities of fashion, and makes their portraits not only for their own day, but equally so for future times.



a

The great masters of portraiture are Velazquez, Titian, Vandyke, Reynolds, Tintoretto, Rubens, Holbein, Rembrandt, Gainsborough, and Lawrence; the examples which they have bequeathed to us, are generally distinguished by an absence of affectation and effort, both in the attitude of the figures and expression of the head. Many of the masters above-named painted historical and religious subjects of large dimensions, which only further increased their artistic powers when treating the portrait. One marked difference may be observed between the pictures of the Italian and

* The doll-like, frizzled, painted, and hooped infantas and donnas of his time were too much even for the great Velazquez. Their effigies remain exemplary monuments of the absurdities of fashion

Spanish masters of 1500 and 1600, and the portrait painters of our own time; which is the total absence in the former of all smirking, simpering expression, or meretricious flashing of eyes. Their earnest, quiet, thoughtful gaze by contrast, often, indeed, seems to us, severe, habituated as we are to the "portrait of a gentleman" of our Exhibitions, and to the conventional smile with which the gentleman before-named makes our acquaintance.

Vandyke is, probably, the one of the great masters of portraiture with whose works we, in England, are most familiar; he studied in too good a school not to have been perfect in composition, but occasionally in his disposition of the *hands* of his portraits there is a mannerism and affectation not seen in the art of Titian or Velazquez. His finest portraits were painted at Genoa, and exist in the palaces of that city. In the Museo of Madrid are fine portraits both by Rubens and Vandyke, some by the former equestrian, evidently painted in emulation of Velazquez, but both masters succumb to the talent of the great Spaniard.*

In this picture of "Queen Henrietta Maria and Family," by Vandyke, we have an excellent example of the master; the composition of the group is "angular," and perfectly balanced in its lines, as a reference to our analysis will show, *b*. The corsage of the queen is the first opposing angle, beginning at the top, which is afterwards repeated by the arms; whilst the skirt of the infant's dress, the arm of the chair, and the succeeding lines below, in their aggregate, antagonise the main diagonal. The horizontal and perpendicular lines are furnished by the architecture and column; whilst the folds of the drapery above, and in the skirt of the queen's dress, repeat the same direction of line in fainter forms. The princess's head does *not* come immediately under the line of the chair, but at the side; the dogs are neither of them *on* the line of her dress. The *nearest* object—the dog—is under the *distant* palace. The direction of the two children's heads balance and vary with that of the queen, which is seen three-quarter, and composes well with that of the infant; the disposition of the hands is natural, and even the dogs are in good composition.*

b

(*To be continued.*)

* The gallery of Madrid is the finest in the world; it contains twelve undoubted Raffaelles, including "Lo Spasimo," "La Perla," and the "Tobit;" forty Titians; Velazquez, Murillo, and Rubens, about seventy of each, besides an equal proportion of all the great painters.

* Lodge's Portraits offer numerous portraits by Vandyke for the study of the reader.

MR. HARDWICH ON THE MANUFACTURE OF PHOTOGRAPHIC COLLODION.†

PREPARATION OF COLLODION.

1. *The Pyroxyline.*—I have always adopted the plan of laying in a large stock of acids at one time, since it is somewhat troublesome to ascertain the exact strength, and no mode of analysis seems to be perfectly satisfactory. The manufacturer sends in three carboys of oil of vitriol, holding six gallons each, and one carboy of strong nitric acid of the same size. These are bottled off into Winchester quarts, or half-gallon stoppered bottles (labelled No. 1 for the first carboy, No. 2 for the second, and No. 3 for the third), for the sake of greater convenience in handling, and to lessen the chance of the acid absorbing water from the atmosphere. As the strength of the oil of vitriol in each carboy is different, a mixture must be made of No. 1, No. 2, and No. 3, taking a single bottle of each. Then, supposing the

† Continued from vol. iii. p. 346.

specific gravity of the acids to be nearly as before given, mix as follows:—

Oil of vitriol, 1.843 at 60° F. ...	... 18 fluid ounces.
Nitric acid, 1·457 at 60° F. ...	... 6 ,,
Water	... 5½ ,,

Pour in first the water, then the nitric acid, and lastly the oil of vitriol; obtain a perfect admixture by stirring, and take the temperature. If the thermometer rises to 165° F. or 170°, the acid must be allowed to cool until it stands exactly at 150° F. Then immerse the cotton in pieces well pulled out, and weighing thirty grains each, continuing to put them in singly until *ten* have been introduced, making 300 grains in all. This operation, together with the pressing against the sides of the vessel, &c., (to be alluded to again presently,) will occupy about two minutes, after which the vessel may be covered up and left for eight minutes more. Then take out the whole of the pyroxyline in one lump with glass spatulas; squeeze out as much of the acids as possible in a porcelain capsule, and dash the whole into a large quantity of water.

An experienced person will be able to judge at this stage of the process whether he has hit the right point. If, on attempting to lift out the whole mass of pyroxyline at once with the glass spatulas, it seems rather small in quantity and very rotten, so that little pieces break away and are left behind in the acid, then the temperature is too high, or the acids are too weak, and in repeating the operation the quantity of water may be diminished by two or three drachms. If, on the other hand, the mass of pyroxyline appears large, sticks well together, and shows no tendency to tear, either the temperature has fallen several degrees, or it will be advantageous to work with a few drachms more of water.

Whilst the pyroxyline is washing in the tray, it is still more easy to judge of its quality; for if the ten separate pieces, in which the cotton was originally weighed, are seen floating about, and can be separated and counted, the acids are certainly too strong; whilst if there be an evident aspect of commencing solution—a piece of cotton here and there scarcely changed, but the others in a measure broken up, and tearing easily under the finger—the operation is probably successful; but when the whole is so mixed up together that nothing but fragments of the ten pieces can be detected, then the pyroxyline is too weak.

I find that it takes twenty-four hours to insure the proper washing of the pyroxyline, even in a slowly-running water which contains a portion of chalk. This carbonate of lime evidently acts in neutralising the acid, and bubbles of carbonic-acid gas form, which bring the cotton by degrees to the surface of the water, and keep it floating.

After a thorough washing, the pyroxyline is squeezed in the hand, and then picked out to dry upon a cloth. A boy performs this part of the operation; and after a little experience, he can tell easily whether the material was properly made, partly by the extent of surface which it covers upon the cloth, but more easily by the readiness with which it tears under the fingers. If it resembles the original cotton in appearance, and feels strong and tough, the amount of water in the acids must be increased; but when it breaks up into little bits, it is as it should be, or else is somewhat too weak, in which case the fragments will mat together, so as to increase the difficulty of picking them out. As the pyroxyline dries upon the cloth it is well to examine it and give directions accordingly, separating any piece which appears less acted on than the rest.

Two or three days' exposure to the air will render the soluble cotton sufficiently dry; but it is convenient to finish it off on the hot steam-bath before described, and the temperature in which is not allowed to rise higher than 120° F. When dry, proceed to weigh it in the scales, and form your estimate of its value accordingly. A long experience convinces me that, supposing nothing to be lost in the washing, the weight of the resulting pyroxyline is a certain and safe guide in this process, and I can always tell what the quality of the collodion will be by using the scales. If 300 grains of cotton yield 450 grains of pyroxyline, it is certain that complaints will be made of the resulting collodion being thick, and giving streaky pictures: four or five additional drachms of water in the nitrosulphuric acid will be the remedy. When the weight of the pyroxyline is the same as that of the original cotton, viz. 300 grains, there will be a sediment on dissolving it in the mixed ether and alcohol; nevertheless, the collodion, although lessened in quantity, will be good—very limpid and structureless, with great adhesion to the glass, less tendency to markings of all kinds, and considerable softness of negative, with sensitiveness to dark rays. The chance of spots, however, is peculiarly great with this collodion; for if the smallest particle of dust touch the film, it will almost certainly arrest the development, and produce a transparent circular mark.

The weight which, on the whole, I think to be best is 375 grains, that is to say, exactly 25 per cent. of increase: this gives sufficient fluidity of collodion, and at the same time leaves very little sediment in dissolving.

The above facts are quite reliable, since they have been verified by repeated observation, extending over a long time. It must, however, be distinctly understood that the weight of the pyroxyline can be taken as a criterion of quality only under the conditions stated in this paper—the fibre of the cotton must be cleaned by potash and quite dry, the nitric acid nearly free from chlorine, the time of immersion always the same, and, most important of all, the temperature correctly ascertained, otherwise the weight will be so variable that nothing can be deduced from it, and the cotton may be considerably acted on, even when the acids are strong enough to produce an explosive variety of pyroxyline. The whole process, in fact, requires care, because it is conducted with the maximum quantity of water, and at a high temperature. At least 20 per cent. of the pyroxyline is dissolved in any case; and the acids having once begun to act, will readily destroy the remaining portion of the fibre, if an error be permitted.

(To be continued.)

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. S. BOURNE.

We come now to the *development* of the latent image. When, foot-sore and fatigued, the photographer returns from his ramblings, he has now the pleasantest of all the operations connected with the art to undertake. And in his anxiety to see how his pictures will turn out, he frequently denies himself the rest which nature craves, until he has satisfied himself that he has nothing to fear, and that a goodly number of excellent negatives will crown his exertions. Supposing, however, that the plates are right in every other particular, the beauty of the resulting picture depends greatly on the manner in which this operation is conducted. I wonder how many excellent negatives have been spoiled by bad development? more, probably, than by any other cause. It requires careful attention and considerable experience to do it properly, combined with great cleanliness.

The operator will require *two glass measures, a glass rod, a developing stand with adjusting screws, and a spirit level.* The developing mixture, which should be made just before using, is composed as follows:—

Pyrogallic acid	1 grain.
Beaufoy's acetic acid	1 drachm.
Distilled water	1 ounce.

And another separate solution of 10 grains of nitrate of silver in 1 ounce distilled water.

When these have been filtered, pour as much of the first mixture as suffices to cover the plate into one of the measures,

* Continued from vol. iii. p. 349.

and any portion of the silver solution into the other, taking especial care that both measures and glass-rod are perfectly *clean.* The developing stand having been made perfectly level, and the light, if a candle, surrounded by a piece of yellow paper, the impressed plate is now to be carefully taken from the box, and immersed in distilled water for *one* minute. The vertical bath used for washing comes in very useful for this purpose, and the plate by its means is wetted uniformly. It is then to be lifted out, drained slightly, and laid at once on the stand, and the first mixture poured gently over it, blowing it well up to the every edge. In about a minute it must be poured back into the measure, and a few drops of the silver solution added, say ten to each ounce, stirring well with the glass rod. Pour it gently over the plate again, using the same precaution as before. If it has been rightly exposed, the image will now begin to show itself, gradually increasing in vigour as the development proceeds. The mixture should be kept moving by gently blowing on the plate. In a short time it will turn discoloured, when it must be immediately poured off, and the plate washed with water. The image must now be examined to see how the development is proceeding. It will most likely require a fresh dose of the developer, which must be applied as before. But before doing so, wipe out well the glass measure from the black deposit which settled at the bottom, as, if this precaution is neglected, the next portion of developer which is poured into it will turn black almost immediately, and great risk of stains on the picture is incurred.

It is at this stage, especially, that the greatest caution and judgment are required, as regards the amount of silver to be added to the developer—for on this depends the beauty or worthlessness of the result. If, on holding it to the light, all the details of the picture are distinctly though faintly seen, it is going on all right, and double—or if it has been at all over-exposed, treble—the original quantity of silver may be added to strengthen it and increase the opacity of the high lights. But if, on the other hand, scarcely any of the detail can be seen, and the high lights have already attained considerable opacity, you may conclude that the plate has been somewhat under-exposed, and in this case a very small portion of silver must be added, not more than two or three drops to the ounce of developer. If it has not been *greatly* under-exposed, this will allow of the half-tones being brought out without *blackening* the high lights to that degree which would spoil the picture.

The great fault with the majority of amateurs, especially beginners, is developing the image too quickly, by putting in too much silver, and imagining that a good negative consists in having the high lights perfectly black, and the shadows perfectly transparent. When a negative of this description is printed from, all light coloured objects, and those whose rays act the quickest, such as the slated roof of a house or church, a beaten path or gravel walk, or a stone building brilliantly illuminated by the sun, are represented only by patches of white paper, while all objects in shadow are rendered invisible by being necessarily so deeply printed, thus, as it has been aptly termed, giving it the appearance of "soot and whitewash."

A good negative is one in which violent contrasts are absent, in which the detail of the high lights is well preserved, and that in the shadows all brought out, and where the whole picture is marked by a beautiful scale of gradation. I confess it is not always an easy matter to obtain these qualities, but a negative that does not possess them cannot be classed as a perfect production.

When the development has been carried to the proper extent (which should be somewhat farther than is ultimately required, as a portion is taken off by the fixer), it must be well washed in water, and immersed in a solution of hyposulphite of soda, until the yellow iodide of silver disappears. It is then to be well washed again to remove every trace of the hypo., and set aside to dry. When quite dry, it may be varnished, and in a few hours is ready to print from.

I have described the operation of developing thus minutely, because, as I have before said, it is one of the greatest importance, and one in which beginners especially fail. There is nothing new in what I have stated, nothing with which an experienced photographer is not fully acquainted. But the few simple hints I have thrown out in this paper, were not intended so much for the experienced and successful photographer, as for those who feel they have still much to learn, before they can calculate on anything like general success. I confess that I have but few qualifications to entitle me to occupy the position that I do on this occasion; but if I have any claim at all, and if some degree of success has rewarded my exertions, it is owing to a spirit of determined perseverance, and a long-continued battle with difficulties. And, judging from this experience, certain I am that the best service I can render you, and the best advice I can give those who may now look disparagingly on their own productions (if such a thing were possible), and who are often cast down by their ill success, is to remind you again of the old but encouraging glorious maxim,—Patience and perseverance overcome all obstacles, and constitute the sure and certain pathway to success.

(*To be continued.*)

PREPARATION OF THE DOUBLE CHLORIDE OF GOLD AND POTASSIUM.

BY. M. FORDOS.

DISSOLVE 100 parts of gold in a mixture of 100 parts of nitric acid, and 400 parts of hydrochloric acid; evaporate the solution so as to produce the hydrochlorate of the chloride; then add distilled water, and 51 parts of bicarbonate of potassa; evaporate it to dryness, then expose it to a gentle heat so as to drive off the excess of acid. Dissolve the dried product in distilled water; filter the solution through powdered glass or asbestos, and evaporate it to obtain crystals, which consist of 1 equivalent of perchloride of gold, 1 equivalent of chloride of potassium, and 5 equivalents of water:—$AuCl_3,KCl+5HO$. The chloride of gold and sodium is prepared in exactly the same manner; only 73 parts of carbonate of soda must be added to the solution in place of the 51 parts of bicarbonate of potassa; its formula is $AuCl_3,NaCl+4HO$.

ON THE ENLARGING OF POSITIVE PROOFS BY THE SOLAR CAMERA.

BY M. BERTSCH.

1. *Disadvantages of convergent lighting.*—When a section of the cone of solar rays transmitted through a non-achromatic convergent lens is projected on a screen, we remark that if the experiment is made on this side of the principal focus, the field is composed of a brilliant central disc, representing about a fourth of the illuminated surface, then of concentric circles of varying intensities. This appearance is due to dispersion. The central disc is the image of the pencils which traverse the axis and neighbouring parts without being sensibly refracted, while the zone that surrounds it, produced, on the contrary, by the most inflected pencils, is only a mixture of violet light with white light, followed, in the well-known order, by zones of blue, green, yellow, orange, and red, so that the field of light is always fringed with red. If the experiment is made on the other side of the principal focus of the collective lens, the phenomenon will be reversed; the central parts will become red, and the borders violet. Masked by the great quantity of white light resulting from the mixture of a large number of rays of different colours, this arrangement will really be apparent to the eye only upon the borders of the field, but, as we shall see, it exists, nevertheless, in every part of it. If we take a crown illuminating lens, of which the principal focal distance of the red ray is 30 centimètres, we shall see that, for the violet rays, this distance will be only 27 centimètres. The mean rays are found comprised at unequal distances between these two points.

For an amplifying apparatus take a simple achromatic converging lens, and project upon a screen the enlarged image of the sun which is found in the focus of the collective lens. We have seen, that on account of the dispersion, this focus is not single, but comprised between two caustics of a certain length.

If, therefore, we focus the most distant, which is, consequently, the most refracted, we shall have a red image of the sun upon the screen.

Suppose this image is focused at 30 centimètres, we shall see that, to obtain the same clearness for the violet image, we must bring the screen 5 centimètres nearer to the amplifying lens—a position where only the violet ceases to be divergent. Now, substitute in place of the screen a sensitised plate, also placed at 30 centimètres, the image that it gives will be a sort of target composed of concentric rings of very different intensities. The central disc produced by the red, although it appears very luminous, will have but very feebly impressed the film, while the exterior zone, composed of divergent violet light, will have given an opposite result.

The intermediate zones will also have given their images in proportion to their chemical action. It is unnecessary to add, that if we have taken for the centre of the image the shortest, that is, the most refracted rays, the effect will be inverse, and we shall have a centre much more impressed than the borders. A negative, or any other object, composed of translucent and transparent parts, submitted to amplification in such a light, will give a proof unequally illuminated from the centre to the circumference, the field of illumination being composed of concentric rings of different intensities.

We shall see that inequality of lighting is not the only inconvenience the convergent light presents. Two other phenomena also concur in this case to disturb the clearness of the images. When we wish to project a slightly-enlarged image of a small plane object, by means of an objective in which the spherical aberration is well corrected, one thing immediately surprises us—we cannot focus all the parts at once. The focus for the centre is much shorter than that for the circumference. This difficulty is explained not by spherical, but by the effect of chromatic aberration. The field of light, as we have seen, is composed of zones of colours of unequal refrangibility; the object sends no specular light, and but little diffused light, because it is almost transparent; so that lighted in the centre by transmitted red light, starting from this point it is successively lighted by yellow, green, blue and violet, the undulations of which have neither the same length, amplitude, nor duration. The amplifying apparatus also shows us in this case that the field of light is only white light, mixed with the tints resulting from dispersion.

With convergent or divergent light there are, then, no means of lighting or focusing equally, from the centre to the circumference, all the parts of an object of any size; and this is one reason why the solar microscope, as at present constructed, has remained an instrument of curiosity; and that, without the modifications I have made in it, it would be useless for photographic purposes.

It remains to demonstrate, that a third cause of disturbance, and one of the most important, also results from the convergent lighting. To avoid complicating the question, and to confine ourselves within the practical limits of a superficial enlarging of five or six times, we shall admit that the convergent rays which emerge from the collecting lens are white light. In examining these rays, after interposing a parallel glass in their path, we see that the caustics, which limit their focus, are much lengthened, while, at the same time, the field of light is changed in aspect. We now encounter the phenomenon of interference. From the centre, where the refraction is *nil*, up to the circumference, where it is at its maximum, the pencils fall upon the glass with very different incidences, so that, upon their emergence, the relation between their sinuses of refraction and incidence is changed: they then proceed together, in a less parallel direction, and interfere with each other before arriving at the focus. The final result is a new disturbance in the equality of the lighting, which is also complicated by the fact, that the glass that sustains the film never has parallel faces.

It is only necessary to substitute a microscopic object for the transparent glass to recognise the influence of this new cause of perturbation. Blurs of diffraction form upon all the contours; the details are vague, the lines faint, blurred, and multiplied.

It is said that a convergent lighting is the only condition which admits of the employment of all the transmitted light; and the reason assigned is, that the focus of the lighting cone is found upon the optical axis of the amplifying apparatus, or, rather, upon the first lens of the doublet of which it is composed.

To become satisfied, on the contrary, that this luminous point is of more harm than good, we have only to fasten a wafer on the centre of this first lens, where the collective lens has its focus: the image is immediately improved. Finally, let us follow the path of the light in the amplifying, as we have done in the lighting, apparatus. What is this luminous point? It is the image of the sun, which I suppose to be a single one, although the convergent lens, not being achromatic, gives a good many. It does not contain the miniature image of the negative, as might be supposed, for the light of this point to be efficacious; on the contrary, it results from the union, in the focus, of all the pencils which have traversed the transparent parts of the glass. To examine what will be the effect, let us imagine a case. This image will be nearer or further than the principal focus of the doublet of which the objective is composed —or, rather, it will coincide with this focus. In this latter case, it will give, upon the screen, a bundle of parallel rays, or a disc smaller than the field of light necessary to illuminate the negative; if further than the principal focus, and enlarged by only one of the lenses of long focus composing the objective, it will form a round image of the sun in the midst of the amplified negative; if nearer, a bundle of divergent rays, which will cover the projected image with a luminous veil. Far from strengthening the effective light, it will serve only to veil the proof, and make it less vigorous. From what we know of interferences, we may say that, penetrating the apparatus under a different incidence from that of the light transmitted by the negative, it is the cause of a supplementary diffraction.

2. *Means of obtaining parallel lighting.*—The study I have for a long time made upon the influence of the lighting upon the clearness of the results, would not, nevertheless, have induced me to make these remarks, if I were not prepared to propose a simple means of diminishing the inconveniences of the convergent light, otherwise scarcely evident in the slight enlargements employed in practice. I should not have pointed out these sources of difficulty, if it were necessary to have recourse to expensive instruments to remove them. Understanding that between an apparatus intended for superficial enlargements of ten or fifteen times, and one for lighting objects enlarged a million times, there must be a very considerable difference, I should have said nothing about them, if I had not thought they could be rectified without much expense.

3. *New amplifying apparatus.*—I have contrived an instrument, which, like the solar microscope, is composed of a reflector moving in two planes, intersecting each other in such manner as to permit the bringing the sun into the optical axis at any moment—of a plano-convex lens, and of a concave lens of variable diameter and focus for three positions. This lens, of the same dispersive power as the first, is calculated, in its diameter and virtual focus, for the place it must occupy in the convergent cone, the rays of which it is intended to render parallel at their emergence.

To lose none of the transmitted light, and to concentrate upon the negative all the parallel light thrown by the reflector upon the whole surface of the collective lens, I have made three concave lenses for changing; the operator is, therefore, enabled to limit the diameter of the bundle of rays parallel to that of the negative to be enlarged. By these means, we see that in the limits of practice, no part of the incident light is lost. The intensity of the bundle of rays is in the inverse ratio of the square of the diameters of the negative lenses employed: thus, there is the advantage of making use of that upon the surface of which the negative may be placed.

In the conditions of parallelism which I place myself, the rays, both upon their entrance and departure, suffer no refraction in their passage through the plate, and the interference of this latter produces no modification. Experience has long demonstrated to me that, in this light, most of the disturbing phenomena disappear, as the focusing is more exact, and the aberration less evident; and lastly, the blurs of diffraction only begin to appear at a distance ten times greater than with convergent light, that is to say, with enlargements a hundred times greater. Still, although presenting advantages over convergent lighting, which appear to me indisputable for the end proposed, in very delicate experiments, and when we endeavour to obtain an image of which the superficial dimensions are magnified five to six hundred thousand times, they give rise to effects which do not admit of their being employed.

[This explanation is incomplete, inasmuch as M. Bertsch

does not say how he amplifies the negative, nor how he gives to the amplified image the greatest possible amount of light. The negative ought certainly to be amplified by a bundle of parallel rays; but to obtain this amplification, he must necessarily have recourse to a convergent bundle of rays, and make the summit of the cone fall upon the amplifying lens.]

PHOTO-ZINCOGRAPHY.

(WITH AN ILLUSTRATION FROM A MANUSCRIPT, SUPPOSED TO BE OF THE TIME OF EDWARD I.)

We have the gratification of presenting our readers with a specimen of the art of photo-zincography, as pérfected at the Ordnance Survey Office, under the direction of Colonel Henry James, R.E.

The most important application of photography yet made is unquestionably that of the reduction of manuscript plans of the Ordnance Survey of Great Britain and Ireland, and the results obtained by this application, in the economy both of time and money, are as remarkable as they are important.

Previous to the application of photography to the reduction of the plans to the several scales required, the only means available were the pentagraph, worked by a staff of skilled draughtsmen.

Exercising all due diligence, this method could not be otherwise than tedious and expensive, and quite inadequate to the demands of the public. Fortunately, it occurred to Col. James to avail himself of the resources of photography, and the success which has attended his efforts has far exceeded the most sanguine expectations. The cost, in point of time, is reduced from 4 to 1 in plans of rural districts, and 9 to 1 for towns; while the saving in money amounts to £2,000 per annum, and on the whole survey will amount nearly to £40,000. Work that would have occupied $5\frac{3}{4}$ days with the pentagraph is performed in $6\frac{1}{2}$ hours by photography. A sheet that would cost £1 8s. 5d. if the reduction were made with the pentagraph, costs only 3s. 1d. by photography, which also, in point of accuracy, secures a far more favourable result. The errors due to distortion are extremely minute, and much less than those arising from the use of the pentagraph, or any other mechanical means. The greatest deviation from perfect accuracy in any part of the plans, does not amount to $\frac{1}{400}$th part of an inch in the angle of the rectangle, and even this minute error is not accumulative.

The reductions obtained by photography required to be transferred to the copper-plate for the engraver. Until the discovery of photo-zincography, this had to be done by a tracing from the photograph, made in crayon, which was afterwards rubbed down on the waxed surface of the copper-plate, and then drawn and etched. Various attempts have been made to transfer the photographs to copper, or rather to obtain *fac-similes* of photographs on copper, by means of electro-metallurgic processes; but it cannot be said that they were successful in practice.

Within the past few years numerous attempts have been made to obtain photographic pictures direct on the lithographic stone, from which impressions could be printed in ordinary lithographic ink. The most successful among the experimentalists was M. Poitevin, who availed himself of the property possessed by light, of rendering albumen and gelatine, when mixed in solution with bichromate of potassa, insoluble. As the subjects he copied were in chiar-oscuro, the effect obtained was displeasing to the eye, from the flatness and dryness of the picture, resembling in this respect some of the earliest productions in lithography. Subjects in outline appear to be better adapted to this process of reproduction. An important step in progress was made by M. Asser, of Amsterdam, who obtains a positive proof on paper prepared with starch and bichromate of potassa: this is inked all over, and then the paper is placed in hot water, which dissolves out the bichromate unacted upon by light, and leaves the design intact. This can now be transferred to stone or zinc, in the usual manner, to furnish the number of impressions required.

In the Ordnance Survey Office, certain improvements on M. Asser's method have been carried out by Capt. A. de C. Scott, R.E., which have resulted in what may be termed the chromo-carbon process. Paper is prepared with gum, bichromate of potassa, and lampblack, or any coloured pigment which, when exposed to light under a negative, leaves a positive design in any colour that may be required. This, when inked, is transferred to the zinc plate, to the lithographic stone, or to a copper plate.

An examination of the accompanying specimen will satisfy the observer that this process leaves nothing to desire. The number and importance of the applications of which it is capable are so great, that we can enumerate only a few of the most striking. By it a certain class of line-engravings and woodcuts may be copied—those in which the lines are open and distinct; we do not expect it will be so successful in copying the chiar-oscuro produced by mezzotint. In copying wills, legal documents, &c., it will evidently prove of the greatest value; to the surveyor, engineer, &c., it will especially recommend itself, from the great economy of time and money it secures. It will accelerate the business of the Patent Office in preparing specifications for publication; in fact, in this department of the public service it is capable of effecting a greater economy of time and money even than in the Ordnance Survey, seeing that the field of its labours is more extensive, and will be spread over a greater space of time. Many rare manuscripts of national interest and importance, like Magna Charta, for instance, or Doomsday Book, could be copied in *fac-simile* by this process, and copies distributed to public libraries, museums, &c., throughout the world.

It will be observed that this process possesses a signal advantage over the anastatic process, inasmuch as by the latter only printed documents, &c., could be copied; by photo-zincography, written documents, maps, plans, logarithmic tables, &c., may be reproduced by a process at once as simple as it is inexpensive.*

Dictionary of Photography.

Mercury.—A well-known metal, which forms an important element in the daguerreotype process, as the latent image on the iodide of silver is developed or rendered visible by its vapour.

Bi-chloride of mercury (corrosive sublimate) is employed in photography in the direct positive process on glass, to render the image white, and to strengthen it when necessary.

Metagelatine.—A name given to gelatine, which, being boiled with a diluted acid, loses the property of gelatinising upon becoming cold. Mr. Maxwell-Lyte recommends it for preserving the sensibility of collodion, and as the process has been so recently given by the author in this journal (vol. iii. p. 312), it is unnecessary to repeat it in this place.

Metalloids.—Simple or elementary bodies are divided into two classes:—1st, metals; and 2nd, non-metallic bodies, or metalloids.

Metalloids, at the ordinary temperature of the atmosphere, appear under very different conditions: the one—as oxygen, hydrogen, nitrogen, and chlorine, are gaseous; others are solid—as iodine, sulphur, phosphorus, arsenic, carbon; one alone, bromine, is liquid.

These bodies combine together and form a great many compounds, the most numerous of which are those containing oxygen and hydrogen. Among these compounds, some are acid, some are neutral; others, like ammonia, act as bases.

Metals.—Bodies which possess certain properties in common: such as metallic lustre, opacity, density, hardness, ductility, tenacity, malleability, conductibility of heat and electricity, and fusibility.

All the metals, except potassium and sodium, are heavier than water; the heaviest of all is platinum. They melt at

* See vol. iii. p. 336, "Report of the Progress of the Ordnance Survey."

very different temperatures; mercury is liquid at ordinary temperatures, while platinum requires the heat of a forge to melt it. All the metals combine with oxygen to form metallic *oxides*. Mixed together, they form *alloys*; the combination of mercury with other metals forms *amalgams*.

(*To be continued.*)

The Amateur Mechanic.

WOOD—(*continued*).

A REQUISITE of the first importance in joining wood is *glue* of good quality. Before describing the various kinds of joints, we will offer a few suggestions as to the selection and preparation of this article. Glue of the best quality is, we believe, generally known in commerce as Scotch glue, or Russian glue, although it does not necessarily have its origin in either of the countries from which its name is derived. In selecting it, see that it is crisp and light coloured, tolerably transparent, and free from cloudiness when held up to the light. That which is very dark-coloured and opaque, is generally of inferior quality, and deficient in adhesiveness; it should, therefore, be rejected in purchasing. All glue is affected by the weather—becoming soft in damp weather, and, if good, crisp in dry weather; if, however, it remain at all times somewhat soft and without crispness, it should be rejected. In preparing the glue another test of its quality arises. To prepare it for use, the glue should be broken into pieces, put into a pan, and covered with water to soak, previous to boiling. If the quality be good, it will absorb the water and swell considerably, but will not dissolve at all without the application of heat. If, on the contrary, the water be found glutinous, and the glue, instead of being swollen, is partially or wholly dissolved, the quality is bad or doubtful. When the glue is sufficiently soaked and has become quite gelatinous, it should be placed in the glue pot, which, as most of our readers know, consists of an outer vessel to contain water, and another within it to hold the glue, so as to heat it by means of a water bath, as, if the vessel containing it were placed in direct contact with the fire, it would be apt to burn. The application of heat reduces the jelly to a thin liquid, when, as a further test, if the glue be good, it will, when the glue brush is dipped into it, draw out into thin filaments, instead of dropping off in single drops as water would.

For use, the glue should be moderately thick; a little practice will assist the judgment in determining the right strength. It should be used quite hot, being applied with a hog-hair brush: where the joint will admit of it, the two glued surfaces should be rubbed together until the glue is nearly set; the joint should then be pressed firmly together, and placed to cool, care being taken that the joint be so supported that no strain can be on it until perfectly set and hardened.

We shall now proceed to describe a few of the most simple and common modes of joining wood, observing at the same time that the circumstances under which the various kinds of joints are to be specially applied must be a matter of judgment on the part of the amateur; as, in describing them, we can do little more than point out the peculiar characteristics of each.

Tenon and Mortice.—This joint consists of a square piece called the tenon, cut at the end of one piece of timber, to fit into a socket called the mortice, cut in the side of another piece. The form is shown in the engraving—figure 1 being the tenon, and figure 2 the mortice:—

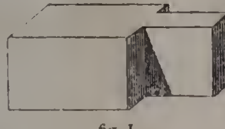


fig. 1

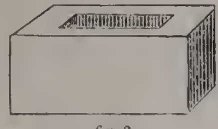
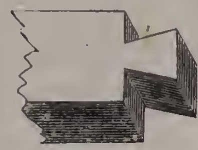


fig. 2

This kind of joint is useful in any kind of framework where there is no lateral strain to pull the tenon, which is on the horizontal piece, out of the mortice, which is cut in the upright. Some consideration should be given to the amount to be cut away in forming the tenon; as, if too much be cut away, the tenon is weakened; and if too little be cut away, so as to leave the tenon too large, the amount to cut away, in making a mortice sufficiently large to admit the tenon, will weaken the upright. As a general principle, it will be well to divide the end to be tenoned into three parts—one for the tenon and two for the shoulders. It is scarcely necessary to say, that a tenon should always be the end of the grain of the wood, or it would, of course, be quite destitute of strength, and useless.

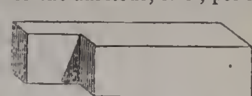
Dovetailing.—This joint is somewhat similar to the tenon and mortice, but is so formed as to make provision against a lateral strain, and is, therefore, capable of more frequent and general application than the former. The pin, as that part answering to the tenon is called, is of a wedge shape, something like the tail of the bird from which its name has been taken; and the socket, of course, a similar shape, to receive the pin. The form of the pin is shown in the margin; the socket is, of course, shaped to receive it.



The amount of bevel given to the dovetail greatly influences its strength; and hard, close-grained wood, not apt to split, will admit of a greater bevel than softer woods, such as deal; at the same time, provided the dovetail is such as will prevent the pieces being pulled apart, the less bevel the better. The remarks as to the strength, made in reference to the tenon and mortice, will apply to the dovetail. This joint will frequently be found of great value in framing wood together for all kinds of purposes, as boxes, drawers, cameras, printing frames, &c.

Groove and Tongue.—This is a joint which will rarely be required by the amateur mechanic, and would, moreover, render necessary tools expressly for the purpose, such as the grooving plane. It is used for joining several narrow pieces of wood together to make one broad one, and amounts, practically, to the making a long tenon down the side of a piece of wood instead of at the end, and fitting it into a groove instead of a mortice. The remarks on the strength of tenons will be equally applicable here.

Lapping.—The lap joint, made by what is sometimes called *halving together*, is very simple, and frequently very useful. For the amateur, it is, perhaps, the most easily managed of all joints, as it involves the necessity for no especial dexterity in the use of tools. Where the pieces to be lapped are of equal thickness, just half the substance of each piece is cut away, each piece being alike, so as to fit into each other. The form is shown above.



Where the pieces are of unequal thickness, the greater amount will be cut away from the thickest piece, so as to regulate the strength of each.

This kind of joint is especially useful for simple frames of any kind, such as are used for straining pictures, being at once strong, and easily and quickly managed.

Dowelling.—This is a useful and simple mode of jointing. It is very similar in principle to the tenon and mortice, the chief difference being that the dowel is round whilst the tenon is square. The reader is familiar with this joint, as being most commonly used in the jointing of chairs. The dowel has, however, frequently a more extended application: two pieces of wood being joined by it, on neither of which a tenon or dovetail could conveniently be cut. In this case a hole is bored in each, and a dowel, consisting of a round piece of some tough wood, such as beech, is cut long enough to insert into the two holes and connect them together. This is a mode of joining pieces of wood side by side, which may frequently be used with advantage, as being easier and simpler, instead of grooving and tonguing them. The reader may be familiar with this use of the dowel, if he has observed coopers' work, in which the pieces forming the heads of casks are frequently dowelled together.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 26*th March*, 1860.

AT the last meeting of the French Photographic Society, M. Bertsch read a long paper *on the Magnifying of Positive Proofs*. This dissertation is important in its applications to photography; I send it to you.

The project that M. Bertsch has in view in the construction of his new photographic apparatus, alluded to above, is, in the production of enlarged positives, to render the rays of light parallel to the optic axis. He asserts that the indistinctness observed in proofs obtained by an apparatus such as that of Mr. Woodward's, is produced by the light received by the mirror, and condensed by the large lens, traversing the plate under a certain inclination, thereby giving birth to phenomena of interference and diffraction, which produce very bad effects. To remedy this, he proposes to place behind the condensing lens a small negative lens, which, taking up the rays, renders them parallel, so that the plate illuminated perpendicularly to its surface acts like a natural object and transmits its image to the magnifying apparatus without distortion, &c. This process absorbs a certain amount of light; but M. Bertsch, instead of producing upon chloride of silver a single positive proof, finds it more advantageous to employ some rapid negative process, furnishing a magnified negative image, from which an unlimited number of positives can be produced afterwards.

M. Bayard has remarked upon the truthfulness of the latter observation; he asserts that, with the apparatus of Mr. Woodward, it took him an hour and a quarter to obtain a magnified positive; whereas he had produced an excellent enlarged negative in about three minutes.

The French Photographic Society has now been in existence for five years; it has at the present moment funds amounting to about 20,000 francs (£800 English). The members of the society are not exceedingly numerous, but they pay what is considered a high premium for the honour of membership: resident members contribute 80 francs a-year, and honorary members 40 francs a-year, to the funds of the society.

In my last letter, I made known the curious observations of M. Pouchet upon the microscopic bodies brought down to the ground by a fall of snow. Among them he remarked some grains of starch of a blue colour, as if they had met with particles of iodine whilst suspended in the atmosphere. The author, in a second communication to the Academy of Sciences (last Monday), says, that before he could think of publishing this observation, he had waited until he had seen these blue particles of starch, at least, twenty times. "Its coloration was certainly like that produced by iodine; but," he observes in his new communication, "starch which has been coloured blue by iodine soon loses its colour when exposed to the air and the light." . . . "A few days ago," continues M. Pouchet, "I placed upon a little starch paste some of the microscopic bodies I had collected from the melted snow, and in a week's time they occasioned upon the starch the production of a most magnificent blue colour, which became darker every day." This colour is not decomposed by the action of light and air. Some blue letters traced upon starch by iodine disappeared, in the above circumstances, in the course of a day; other letters traced with the starch, coloured by the microscopic particles before alluded to, were not the least affected.

"What is the coloration owed to?" continues M. Pouchet. "I cannot say. Is it to be attributed to some peculiar effect of atmospheric iodine? Is it the result of the development of some new substance? Is it a photogenic phenomenon? . . . . *That which is certain for me* is, that it is the same coloration I noticed on the grains of starch suspended in the air, and that it is due to the same cause."

M. Petitjean has invented a new galvanoplastic apparatus, which I shall describe in his own words:—"To cover objects with *copper*, I place a metallic vessel filled with a solution of copper (for instance, the sulphate) in the centre of another vessel containing water strongly acidulated ($\frac{1}{5}$th or $\frac{1}{8}$th) with sulphuric acid. Into the acidulated water plunges a piece of zinc, which communicates by a conducting wire with the object to be coppered; the latter plunges in the sulphate bath. The only precaution necessary is, that the object to be coppered does not come in contact with the sides of the metallic vessel. The same remark applies to the zinc."

The metallic vessel above-named must be of copper when it is desired to cover an object with that metal (and of silver when the latter metal is to be deposited); it serves as positive electrode, and keeps up the solution of the salts of copper. The operation of coppering by this method is very rapid, about one gramme of metal being deposited per hour upon a surface of one square decimètre; and no porous vessel is required. The author does not yet know what would be the effect of this apparatus, if arranged as a battery. He is at present occupied with experiments in that view.

THE BLACKHEATH SOCIETY AND THE REPORT OF THE COLLODION COMMITTEE.

To the Editor of the "Photographic News."

Sir,—The postman has just placed in my hands your journal of the 24th, containing a report of the last meeting of the Blackheath Photographic Society, and, as my name is mentioned in it, I think it better to reply at once, whilst the impression is fresh upon my mind. At the March meeting of the London Society, a conversation took place on the collodion report, and subsequently I wrote a letter to the Society's Journal in a semi-jocular strain, hoping thus to terminate the discussion, or, at all events, to put it in a fair way of being terminated. In this letter I spoke of Mr. Heath and others as *the Opposition*, but only in a "Pickwickian" sense, as Mr. Dickens terms it, for Mr. Heath's remarks were clothed in friendly language, so that no possible objection to them could be entertained on personal grounds. The speech lately made by Mr. Heisch, however, is of a more damaging character, and can only be explained by supposing that gentleman to be ignorant of the real value of the collodion examined by the committee.

It has been hinted that there is an impropriety in my putting myself forward at all, or attempting to answer any questions. If I had been still a manufacturer of collodion this would be a just observation, but my advertisement in all the journals distinctly states that I have ceased to occupy that position, and that my name no longer appears. I always intended that the advertisement should be read quite literally, but nevertheless, Mr. Heisch has ignored it, and speaks of me as still the manufacturer of the collodion alluded to in the obnoxious report. Under such circumstances, it is doubtful whether I ought to make any reply. I may, however, say, and this time I hope finally, that since the 15th of March I have derived no more pecuniary advantage from the sale of collodion than has Mr. Heisch himself; and further, that I am not hampered with a promise of transfer, or any other condition whatever. Why, then, should I not come forward and speak without any fear? A good thing has, as I believe, been done for the interests of the art, and therefore any such term as "indelicate" or "improper" is quite out of the question.

The members of the Blackheath Photographic Society have condemned the report of the London Society, and have asserted that their attempt to give a definite formula for commercial collodion is, practically, a failure. Ought not, then, the next step of the Blackheath Society to be the formation of a committee out of their own body, to spend some six or twelve months in examining the whole question of collodion? Every one knows the reputation in which their president, Mr. Glaisher, is held, and all are prepared to place confidence in anything he may advance. Will he then put his shoulder to the wheel, and help to guide the public not only out of the wrong way, but into the right one? He will excuse me for using his name or quoting his remarks, seeing that I have not the pleasure of a personal acquaintance with him, but it must be remembered that I am writing under a little excitement, for when one has spent some three or four years in thinking and experimenting on an obscure subject, and, at the end of that time, finds a man of distinguished attainments, and a fellow of the Royal Society, condemning the results as calculated to mislead, there is a strong inclination to come forward and protest. Has Mr. Glaisher duly considered the difficulties which the collodion-maker encounters in striving to accommodate himself to the various and opposite requirements of the photographer? Is it not like being asked to construct a lens with a large aperture

and a deep focus, or an instrument which shall produce instantaneous pictures with a minimum-sized stop? I do not exaggerate when I say that I might write a book in giving my experience as a collodion-maker, and in quoting the letters and observations which individuals who practise photography for one purpose or another, have addressed to me. There is often an utter want of agreement between them, not so much from faulty observation, as from differences of light and temperature, and bath, and developer, and all those thousand-and-one little attendant circumstances which appear insignificant in themselves, but yet very greatly affect the result.

There are some persons who, on perusing the report of the Collodion Committee, have taken a different view from Mr. Heisch, and have thought that it ought to have been conveyed in much stronger language. I do not, however, myself make any complaint on this score, because moderation is always safe, and official statements are expected to be severe and dignified. Nevertheless, I must confess that the report is not precisely the style of document that I should care to put into my pocket and take with me to the advertising office; unless, indeed, I were disposed to become an imitator of the late Dr. Chalmers, who, when he sent his horse to the fair, directed his servant to be very particular in saying, that he had thrown his late master six times.

Perhaps the Blackheath Photographic Society will, on reconsideration, find themselves able to reverse their late decision, and to acquit of intentional injustice not only individual members of the committee, but also all that were concerned in the transaction.

I have already trespassed further on your space than I originally intended, and now subscribe myself your obedient servant,

King's College, March 24, 1860. F. HARDWICH.

THE FOTHERGILL PROCESS.—IMPORTANT INFLUENCE OF A COATING OF ALBUMEN PRIOR TO THAT OF COLLODION.

To the Editor of the "PHOTOGRAPHIC NEWS."

SIR,—Many of your readers will doubtless recollect communications that appeared some two or three months since in the "NEWS," from a correspondent, "M. N. P. S.," advocating a *thorough washing* of the sensitised plate *previous* to the application of the prepared albumen, to which I replied; giving, on the second occasion, an account of experiments illustrating a loss of sensitiveness in proportion to the quantity of water used, and showing that, for all practical purposes, sensitiveness was destroyed by the thorough washing advocated; and your correspondent, in answer, stating that he had prepared quantities of plates by the thorough-washing plan, with the same collodion—viz., my own—and that they were equally sensitive with any prepared with the small quantity of water recommended by myself, &c.

Having no reason to doubt his veracity—though the statement was so completely at variance not only with the conclusions to be drawn from the experiments mentioned, which, I was satisfied, were conducted in a manner to represent the correct facts, but also from my whole experience ever since the first introduction of the Fothergill process—I felt it necessary to look for a solution of the apparent contradiction to some peculiarity in manipulation, which would permit of that extra washing, and that had not received credit for it; and it occurred to me that, if the glass was coated with albumen *previous* to the collodion, when collodionised and placed in the sensitising bath, a sensitive albuminate of silver compound would be formed by the silver solution in the cells of the collodion coming in contact with the albumen underneath, which would, of course, bear any amount of washing—the same as Fothergill-process prepared plates (without this previous coating)—*after* the application of prepared albumen and previous collodionising, sensitising, and diluting-bath on surface; and that "M. N. P. S.," and those who, like him, found sensitiveness *not* injured by the thorough washing previous to the (in that case) second application of albumen, had so coated their glasses—a circumstance not at all improbable, when we take into consideration the extent to which the plan of doing so is adopted—for both wet and dry processes—for the purpose of making collodion film adhere more firmly, and preventing the mischief that arises from imperfectly-cleaned plates.

Circumstances, however, prevented me attending to the matter till within the last few days, during which experiments have shown that the anticipated effect is produced; and that a dry plate, *possessing little less sensitiveness than a Fothergill-process one, may be prepared by coating with albumen and drying; then, with collodion, sensitising, well washing, and drying; and that, when glasses are thus previously coated with albumen, the second application of it—after sensitising and washing—has little, if any, influence on sensitiveness.*

This—which appears a most important modification, and all that could be desired for ease and simplicity in manipulation—is, *per se*, practically not so, owing to the difficulty of entirely removing all free nitrate, and the *thorough* washing consequently necessary to prevent stains. This difficulty is, however, easily overcome by resorting to our old friend, albumen, and proceeding as follows:—

Coat glass with filtered-prepared albumen, not too thin; say—

Albumen	1 ounce.
Distilled water	2 ounces.
Strong liquor of ammonia	12 minims.

and dry; coat with collodion, sensitise in a 35-grain bath, as recommended for the Fothergill process; wash under a tap, or in a dish, with two changes of water; then place in a dish containing sufficient dilute albumen (one-half or one-third the strength before-mentioned) to cover it, agitate for a few seconds, take it out, wash as before, and place to dry, as recommended for Fothergill process. The same albumen may be used for six or more consecutive plates, if it remains quite clear.

That *superior* results, by this plan, to those from the use of 1 drachm of water to every $5\frac{1}{4}$ superficial square inches of sensitised surface, without any prior coating of collodion, as in Fothergill's process, will be obtained, I do not at all anticipate, even if equal; but the amount of skill necessary for success is much less, and a mere tyro in the art must certainly be enabled by it to prepare plates with the greatest certainty, and without fear of stain or mark; the keeping properties, too, owing to the sensitive part being in a manner covered with collodion, may naturally be expected to prove almost illimitable.

The previous coating with albumen will not occupy more time than the thorough cleaning glasses require without it, *much less* care in this respect being necessary, owing to the albumen forming a new surface. When glasses are very dry I have experienced a difficulty in making albumen flow all over them: to obviate this, I generally breathe on them just prior to pouring it on; the albumen for the purpose should be quite clear. I now prefer it after being some time kept, it then both filters and flows freely; it remains good even for months, if the bottle is well corked, and it is better not to return it into the vessel it was poured on the glass from, but let it again pass through the filter before using a second time; the plates should be dried as quickly as possible, by holding them perpendicular near the fire; any convenient quantity may be prepared, and stored in a dry place for use when required. Great care must be taken to remove any albumen that may have got on the back of the plate prior to use; no fear need then be entertained of mischief to the bath if the front is well coated with collodion.

Those who wish to try the effect of a previous coating of albumen on sensitiveness, may easily do so, by coating one-half of a plate only with it, then applying collodion, sensitising, washing, drying, and exposing; when developed, the part *not* coated will prove *non*-sensitive. ALFRED KEENE.

March 28, 1860.

Proceedings of Societies.

NORTH LONDON PHOTOGRAPHIC SOCIETY.

THE annual meeting of this Society took place on Wednesday evening, the 28th inst., G. SHADBOLT, Esq., Vice-President, in the chair.

The minutes of the last meeting having been confirmed,

The SECRETARY read the following

REPORT.

The time has again arrived for your Committee to address you, and it congratulates you on the prosperous state of the Association.

The meetings have been well attended, and the papers read of no ordinary character and merit; much that is novel in photography has been fully discussed, and the mutual desire of the members to

assist each other in the numerous difficulties of the art, has caused the evenings of meeting to be looked forward to with no little pleasure.

Owing to the universal readiness on the part of the members to accede to the wishes of the Committee, and their generous exertions in providing *matériel* for the meetings, the labours of the Committee have been few and light.

As finance is a subject of importance, your Committee deems it a duty to inform you that the expenditure of the past year exceeded the income by a few shillings. As this has been caused by the non-payment of subscription by two members, the Committee has passed the following resolutions with the hope of avoiding loss to the Association, and increasing the advantages of those gentlemen who may be induced to join the Association late in the session:—

"That the subscription of 10s. 6d. per annum, being due on the 31st March, and payable in advance, should be paid before the 28th April, and that the delivery of the Journal be discontinued to those members whose subscriptions are in arrear that day; but on payment of the same any time during the current year, the back numbers shall be forwarded.

"That a member elected any time during the year be entitled to the numbers of the Journal from the 1st April inclusive."

The balance in the hands of the treasurer, after payment of all claims upon the Association to the present time, is £8 17s. 11d.

The Committee is of opinion that each member might enhance the prosperity of the Association by making its advantages more generally known, and with increased numbers, increasing advantages would acrue.

Your Committee would not let this opportunity pass without recording its sense of obligation to those gentlemen who have kindly read papers, exhibited apparatus in the discussions at the meetings, and also to Mr. F. Bedford, for the liberal terms on which he supplied the presentation photograph.

The Report concluded by the enumeration of the various papers which had been read before the Society during the past year.

On the motion of Mr. GOSLETT, seconded by Mr. DAWSON, the report was unanimously adopted.

The election of officers for the ensuing year was proceeded with.

Mr. HANNAFORD said, that in consequence of a change of residence, he should be unable to attend the meetings regularly, and therefore wished his name to be removed from the committee.

The following gentlemen were elected the committee for the ensuing year:—Mr. T. A. Barber, Mr. A. Goslett, Mr. C. J. Hughes, Mr. W. J. C. Moens, Mr. W. Shave, and Mr. G. W. Simpson.

On the motion of Mr. GOSLETT, seconded by Mr. SIMPSON, the officers of the Society were unanimously re-elected, viz.:—Charles Woodward, Esq., F.R.S., President; G. Shadbolt, Esq., Vice-President; D. W. Hill, Esq., Treasurer; Mr. J. Barnett, Hon. Secretary.

Mr. HANNAFORD exhibited a camera, forwarded to him by Mr. John Bailey, of Darlington, having an arrangement to serve in lieu of a spring back, the lens moving instead of the camera. By an ordinary screw adjustment, a slide in the bottom of the camera was projected out to a distance which gave a very long focus. At the end of the slide a perpendicular brass rod was fixed, supporting the lens at the required height, the lens being connected with the body of the camera by a black bag. The horizontal and perpendicular movements were ingeniously obtained by the arrangement of the camera and lens, and the apparatus, though heavier than it need have been, was very compact, and was stated to be perfect in its action. Mr. Hannaford also exhibited two cameras, by Mr. Clarke, of Kennington. To one of them a very simple apparatus for taking instantaneous stereographs was adjusted.

Mr. GOSLETT exhibited numerous specimens of glass and glass apparatus. The latter comprised glass baths, dishes, and dippers, cast in moulds, from a preparation of the common roll glass used for skylights, &c. The sides of the baths were convex, in order to preserve the plate from scratching. The glass was described as very hard, and well suited to the purpose. Among the specimens of glass were the following:—Plates of opal glass used for miniatures; plates of purple glass, the use of which saves the black varnish, or any other contrivance for backing up, and is said to give a fine effect; smooth glass plates for focusing, by which it is asserted that the focus can be more accurately taken than with the ground glass; orange plates, for the window of the dark room, &c. Mr. Goslett observed that the orange specimen produced had been coloured by carbonic acid gas.

The CHAIRMAN said, that in the early days of the Photographic Society, it had been stated by Professor R. Hunt, that paper thus produced would not exclude actinic rays.

Mr. GOSLETT said, the specimen of glass he had shown had been tested with other glass, and had been found to have the same properties in this respect. Ruby glass (a piece of which, of a dark hue, was exhibited) excluded the actinic rays as well as yellow.

Mr. SIMPSON observed, that experiments had been made, showing that ruby glass resisted light longer than either orange or yellow. The chief objection to it was, that it was very dazzling to the eyes.

Mr. HANNAFORD remarked, that it would also make the room darker.

Mr. GOSLETT said, it was considered important to obtain very clear plate glass for printing; but the effect of light upon plate glass was to change its colour, usually to a yellow tinge, and the purer and finer the glass, the more rapid was the change. If such a tinge was obtained, it was reasonable to suppose that the chemical action of the light would be, to some extent, obstructed. It had, therefore, occurred to a gentleman connected with his manufactory, that pale blue or sky-blue glass would be the best to print with. The experiment was tried by one person, who obtained very good results. The action of light also produced, occasionally, a pink tint in plate glass.

The CHAIRMAN said, this seemed to be merely a question of a little more or a little less exposure, which, in the case of ordinary printing, was not of much importance.

Mr. HUGHES thought it better to start with a good white plate, and to change it, if necessary. He, however, was sure that the slight yellow tinge which the glass might acquire, would not prevent printing through it. Mr. Goslett's remarks, he considered, were much more important as affecting the glazing of a room.

Mr. GOSLETT was not prepared to say that sheet glass changed its colour in the same manner as plate glass. He had not inquired into this matter.

Mr. HANNAFORD observed, that if the pale blue glass exhibited would keep its colour, it was decidedly the best; if it also took a yellow tinge, there would be no advantage in using it.

Mr. GOSLETT had never heard of blue glass changing colour; it was a body colour. He had seen white glass change colour, and become as yellow as a guinea in one month.

Mr. QUIN observed that he had found the unground glass very difficult to clean, even the strongest nitric acid failing to remove the dirt.

Mr. SIMPSON said, that diluted fluoric acid might be tried.

Mr. GOSLETT said, that in the case of the opal plates, the fluoric acid would remove the colour. These plates could be perfectly cleaned, in a very short time, by rubbing two glasses together with flour of emery, in the form of an impalpable powder. In referring to the German glass, of which a good deal is now imported, Mr. Goslett said that a gentleman whom he knew had used some German glass to frame a print. In a short time the glass became damp, or, as it was called in the trade, "sweaty." On removing it, he found the print to adhere to the glass, and, when he took it off, there remained a complete outline of the picture on the glass, so that he had two pictures instead of one. It would seem that some chemical action had been going on to produce this effect. The German glass was remarkably soft.

Mr. DAWSON called attention to a statement made by Mr. Oakshot, in a letter read at the last meeting of the Society (see "PHOTOGRAPHIC NEWS," March 2), with reference to the experiments of Messrs. Davanne and Girard. The letter contained the following passage:—"If you refer to the last two or three numbers (of the 'PHOTOGRAPHIC NEWS'), you will find that Messrs. Davanne and Girard assert positively that a quart of hyposulphite solution 10 per cent. will fix only one-and-a-half sheets of paper. This, in plain figures, means, if my calculation be correct, that 4 oz. of crystallised hyposulphite will only just fix ten pictures, 8½ by 6½." At that meeting, the chairman, on hearing this statement, observed rather sarcastically that he doubted whether any one believed it, but, in order to determine satisfactorily a question of so much importance, he (Mr. Dawson) had made certain experiments, the results of which, so far as they had been ascertained, he would communicate to the meeting. He, of course, was not in a position to say in what manner the experiments of Messrs. Davanne and Girard had been conducted, but his inquiries led

him to conclusions entirely at variance with theirs. There was considerable difficulty in obtaining pure preparations, and therefore he had used those of ordinary quality. The chloride of silver he employed had been precipitated with common salt. He dissolved 96 grains of hyposulphite of soda in half an ounce of water, equivalent in proportion to 8oz. of hyposulphite to 1 pint of water. Into the solution he placed 5 grains of chloride of silver, which were dissolved in two minutes. After waiting ten minutes he put in 5 grains more, which were also dissolved in two minutes. He continued adding to the solution 5 grains at a time, and found that the third portion was dissolved in two minutes, the fourth in two minutes five seconds, and the fifth in two-and-a-half minutes. He then ceased the experiments for twelve hours; and, on resuming them, he continued to add portions of 5 grains of chloride to the solution, which were dissolved as follows:—Sixth portion, two-and-a-half minutes; seventh, three minutes; eighth, four-and-a-half minutes. On adding the ninth portion, a copious precipitate immediately fell down, intensely white in colour, and of a very sweet taste. This precipitate was not sensitive to light, and he tried to dissolve it in an excess of hyposulphite, which, however, produced no effect upon it. He then placed it in a sand bath, and, having exposed it for about half-an-hour to a temperature of 180°, it became reduced to a very fine brown powder. He had not yet made any further experiments upon this powder. The temperature of the room in which these experiments were made was kept between 58° and 60°. Blue test paper remained constantly in the solution without change, but as soon as the precipitate was placed in the sand bath, it showed an acid reaction. The liquid separated from the precipitate being evaporated, crystallised in hyposulphite of silver; and, during the process of crystallisation, a dark precipitate fell, the nature of which he had not ascertained. The result of these experiments convinced him that Messrs. Davanne and Girard must be mistaken in their assertions. He had used hyposulphite of soda of the strength of 8oz. to a pint, and found that it dissolved nearly half its own weight of chloride of silver without being in the least affected. (Hear, hear.)

The Chairman said, it might be a satisfaction to Mr. Dawson to know that experiments made by an eminent chemist in a manner somewhat dissimilar, had led to the same results.

Mr. Dawson stated that he had also made some experiments as to the fixing power of ammonia. The first 5 grains of chloride of silver were dissolved in ordinary liquor ammonia in 2 minutes, the second in 2¼ minutes, and the third in 3½ minutes, after which it would dissolve no more. He had, however, fixed some pictures with it, and found the results quite as good as with hyposulphite of soda.

Mr. Quin inquired whether it was quite fair, in the experiments mentioned, to use plain chloride of silver, unacted upon by light?

The Chairman said, that the fact of the plain chloride being used could not account for the great difference in the results obtained by Messrs. Davanne and Girard and Mr. Dawson. On the contrary, if chloride of silver paper were used after it had been exposed to light, there would be less of the chloride to dissolve.

The subject then dropped.

The following new members were elected: Mr. Mainwaring, Mr. Oakshot, and Mr. A. Nicholson.

The thanks of the meeting were unanimously accorded to Mr. Hannaford and Mr. Goslett, for the apparatus they had exhibited, and to Mr. Dawson, for the observations he had communicated.

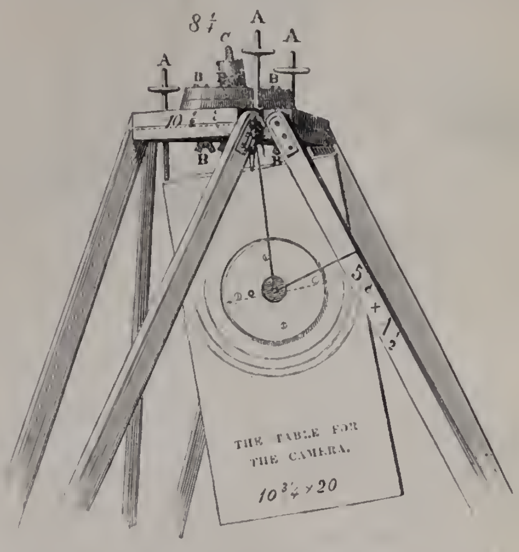
The proceedings then terminated.

[Messrs. Davanne and Girard's statement appears to have been misunderstood. Their assertion is simply this: a solution of hypo. of the strength of 10 per cent. will dissolve only about 1 grain to the ounce, before becoming saturated with hyposulphite of silver and soda. When so saturated, hyposulphite of silver is precipitated, and immediately decomposed into sulphur and sulphide of silver, and sulphurises the proofs. The hypo. solution will dissolve nearly three times as much chloride of silver, and therein lies the danger. The risk of sulphurisation is avoided, by saturating the hypo. bath with common salt, in the presence of which the hyposulphite of silver is more stable.]

New Photographic Apparatus.

CAMERA STAND.

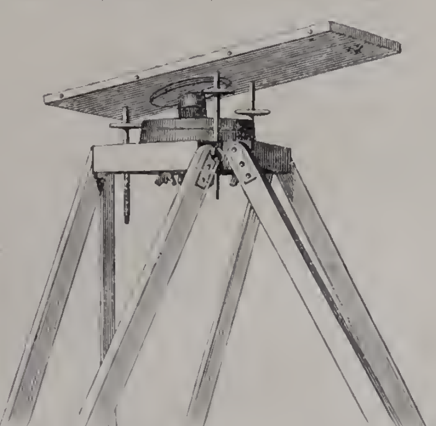
Sir,—I beg to send you the details of a camera-stand. The principle and action will be intelligible, from the plans sent. It is merely a "ball and socket" stand, made after the model of



The screws A A A, 8 inches long, of ½-inch thickness; the rim 2 inches. They pass through two small guide-plates, one being the female screw. B, 4 bolts, with flat heads and winged nuts. C, the screw to hold the table. The point of it passes through the table and enters into the bottom of the camera, keeping it firm.

one sent to me by Messrs. Bland and Long, but firmer and larger than theirs. I have added a fourth retaining screw (B on plan 1). That to which I wish to draw attention is the introduction of the screws marked A A A. By their use, almost

THE TABLE, SCREWED ON, READY FOR THE CAMERA.

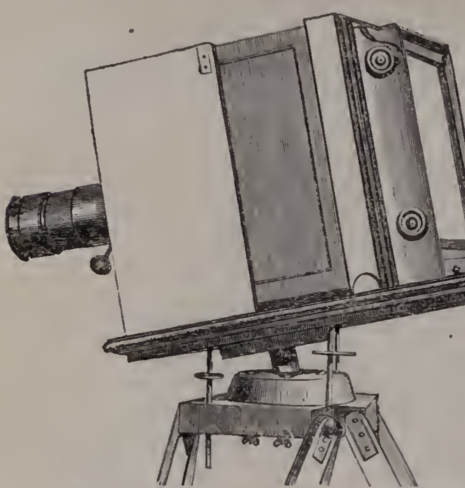


Weight of stand and table, 19 lbs.

any amount of inclination can be given to the heaviest camera. In fact, the bearing of the camera is virtually transferred from the upright stem of the "ball and socket" movement—a mere point—to the points of an equilateral triangle, the sides of which, in my stand, are 10½ inches—a sufficient base for a well-poised camera of any weight or size. The plans show a heavy camera, set at an inclination of 15 degrees; but, evidently, by unequal extension of the legs, any amount of inclination may be obtained.

I have invented nothing; I have merely adapted the adjustments of the theodolite to the camera-stand.

CAMERA, SET AT AN INCLINATION OF FIFTEEN DEGREES.



Weight of camera and a large 4-inch portrait-lens, 37½ lbs.

With a light camera, the "ball and socket" movement may be used alone. I have the honour to be, sir, your obedient servant, N.

Mallow, February, 1860.

Photographic Notes and Queries.

PHOTOGRAPHIC EXCURSIONS.

Sir,—In reply to your correspondent, "Eothen," I would suggest that, if he rises early, and takes the first train, he might reach Cobham Hall, near Rochester—a very fine specimen of English domestic architecture; Rochester Cathedral, or the New Bridge at Rochester, would well repay a visit. Or, if he prefers it, he may go up the river—even as near as Putney or Kew; charming views may be found at every step along the route. Or he may take the Great Western Railway, and reach Stoke Pogis in an hour or so, where the church is a quaint old structure that would well adorn his portfolio. On the London and Northern Railway, he need go no further than Watford, and proceed thence to Chenies, where a perfect gallery of views awaits him.

In fact, with an eye for the picturesque, he need be at no loss for views, take what direction he may. I have found as good subjects on the Regent's Canal, as at a hundred miles from London. At this season of the year, when the trees are devoid of foliage, it is a good time to make studies of the anatomy of fine specimens of the oak, elm, plane, ash, &c. &c. For these we need go no further than the parks, or Kensington Garden. Viator.

REVISED PHOTOGRAPHIC FORMULÆ.

Sir,—I have read so much *pro* and *con* respecting dry processes, Taupenôt, Fothergill, and others, that I am perfectly bewildered, and really do not know what I know. I keep a note-book, in which I enter all new formulæ for sensitising, toning, salting, developing, fixing, &c., and it is very grievous to see how slovenly it looks, although I have kept it with great care. But it is so blotted with erasures, corrections, and annotations, that it has now become nearly illegible, and I cannot trust to it. Will you, sir, oblige the photographic world with what I may venture to call a series of *photographic constants*; by which I mean, the most approved well-tried formulæ, in all the various processes? If you adopt this suggestion, of course, in due time, you will arrive at dry and preserved processes, and then inform your readers with how many drachms of water a plate 10 × 7 should be washed. I know that the doctors differ widely on this knotty point; but you, sir, I presume, are in a position to judge which of them is right. I have wasted much time and materials in following the instructions and suggestions put forth by many notable operators, but I find it time to stop, for at present the burden of my labours is, "never ending, still beginning." There ought to be an eclectic system of photography at this date of progress, and if you will kindly furnish your readers with it, I know many who will be exceedingly grateful for the information. D. T.

PHOTOGRAPHY AND THE MAGIC LANTERN.

Sir,—In a recent number, your correspondent, "J. N. S.," wishes for information for photographing slides for the magic lantern. Some years ago, I made the following experiment for that purpose, and found it succeed:—First, produce a well-defined, not *over-intense*, negative, on half or whole size plate, of any subject you wish for the slide; then place it in a plate frame on a stand before an open window, and proceed to copy the size you require by the negative process. The result will be a picture suitable for the magic lantern. W. H. G.

Liverpool.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Tuesday,	April	3—London Photographic Society.
Wednesday,	,,	4—Manchester Photographic Society.
Thursday,	,,	5—Belfast Photographic Society.
Tuesday,	,,	10—Photographic Society of Scotland.
Wednesday,	,,	11—Chorlton Photographic Society.
Friday,	,,	13—Norwich Photographic Society.

TO CORRESPONDENTS.

L. Minasi.—A careful perusal of the description of the solar camera in No. 75 of "The Photographic News," and of M. Bertsch's paper in the present number, will guide you as to the principles of construction. If no light enters your room except through the negative, there is no need of a black calico, focus of a sheet of white paper, before the sensitive paper is introduced. There is no patent right to interfere with your proceedings.

James Archer.—The only explanation we can suggest is, that the paper was too dry when put into the printing frame. Chloride of silver is not decomposed readily without the presence of moisture. The remedy is to slightly damp the paper before printing, which can be done by laying it between some sheets of damp blotting-paper; but not so damp as to cause wrinkles. We shall be glad to receive the particulars of the dry process.

A Subscriber (Lacock).—In our issue of March 2, it was announced that in compliance with the expressed wish of numerous subscribers, the volumes of the "Photographic News" will, in future, consist of eight months' numbers, and, consequently, the index to the present volume will be published on the 27th of April.

Lincolniensis.—The fault is, probably, not in the varnish, but in the developer. You can make a varnish for positives as follows:—Spirits of turpentine, 3 fluid ounces; pulverised bitumen, 5 drachms; white wax, 1 drachm.

H. D. D. D.—Filter, and boil gently in a clean kettle for half an hour, or an hour; this will drive off the ammonia, and throw down the carbonate of lime and other earthy carbonates.

O. O.—Do not give up one process until you have given it a fair trial. You cannot expect to succeed in so delicate an art as photography by a weeks' apprenticeship to it.

Phil.—The strength of the various iodides depends on the chemical equivalent of the respective bases. Of equal weights of iodide, cadmium will be the weakest, and ammonium the strongest, in iodine.

Charlton.—By washing the prints before fixing, you economise the hyposulphite. Read Messrs. Davanne and Girard's paper on "Fixing," in late numbers of the "News."

Saltum.—The chloride is valuable in proportion to the quantity of chlorine it contains; in that case, chloride of ammonium is the most economical for salting.

Samuel.—Put the stop between the lenses in the portrait combination, and in front of the lens for landscapes.

Tyro.—Iodide of potassium or cyanide of potassium will remove the stains of nitrate of silver.

A. Z.—You cannot understand any explanation that might be given without being familiar with the elements of chemistry.

C. Scholefield.—Dilute nitric or hydrochloric acids ought to suffice for all cleansing purposes in the instances you mention.

Alsop.—Focus upon the backs of two or three books, receding about an inch from each other, and see which gives the most distinct image on the film.

Æolite.—Faded pictures may *sometimes* be restored by immersing them in the gold-toning bath; washing and fixing in hyposulphite of soda.

Chromatic.—The words blue, yellow, red, &c., are relative; the type or standard of pure colours is found only in the prismatic spectrum.

T. B.—You have too much light upon the sitter. The picture is flat; no chiar-oscuro: reduce the light on the sitter's right.

Excelsior.—If your formula is a good one, why seek to improve it? Let well alone.

Carbon.—M. Joubert has not yet published the *modus operandi* of his carbon printing.

S. H. L.—We shall describe a useful photographic photometer in an early number.

Old Hypo.—Your bath will not work well if the temperature is much below 60°.

Y. Z.—We prefer iodide of cadmium, as an iodiser, for ordinary purposes.

R. H. H.—Alcohol, 5 ounces; white lac, 1 ounce; mastic, 1 drachm.

Rushton.—You cannot make photographic collodion without alcohol.

Nemo.—Buy plain collodion, and add your own iodising solution.

E. Osborne.—The temperature you employ is too high.

M. B.—Sidmouth. We shall publish particulars in an early number.

W. H. Hawkes.—The cork forms a good safety valve, if not fastened down.

New Motive Powers.—Full particulars will be given in an early number; also of the new artificial gas.

Communications Received.—The Solar Light.—Photographic Tour in the Vale of Neath (we should be glad to receive the conclusion of the article).—S. L. T.—A Photographer out of Focus.

⁎ All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

VOL. III., No. 83.—*April 5*, 1860.

ON COMPOSITION AND CHIAR-OSCURO.—VIII.

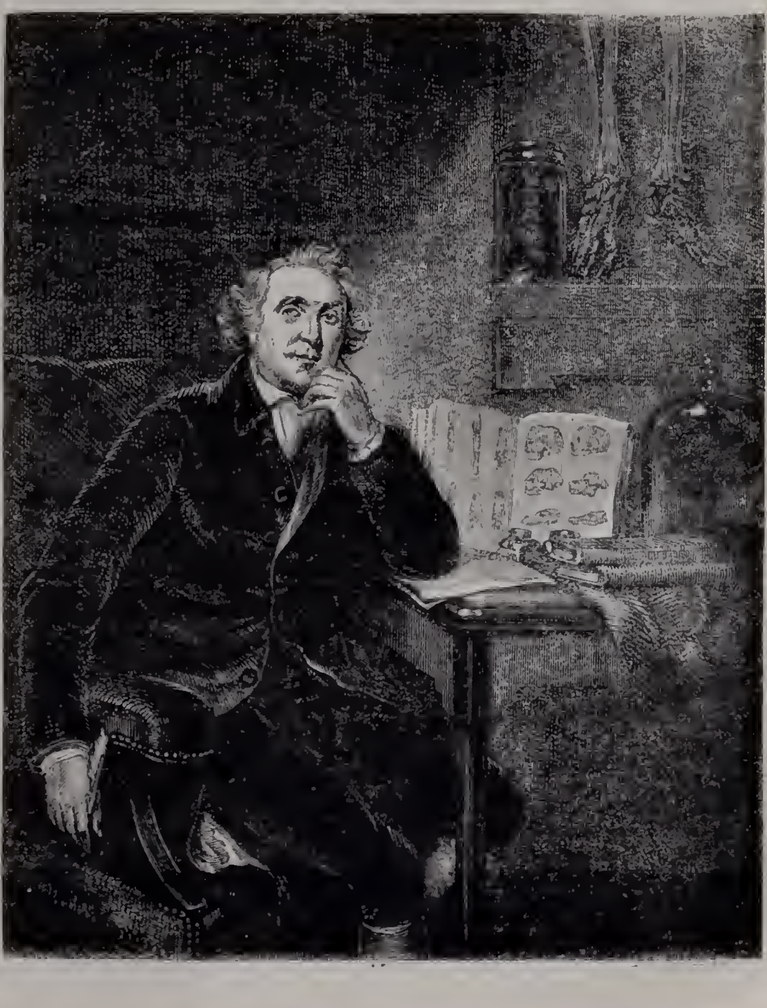
BY MR. LAKE PRICE.

"To hold as 'twere
The mirror up to nature."—*Hamlet.*

REFERRING to the examples of portraiture by the great masters, we find much variety in their treatment, but, on the whole, the portraits which impress the spectator with the highest admiration of their excellence are those which are exceedingly *simple* and *natural* in their attitude and expression. Nothing can be conceived more so than the portrait by Titian in the Louvre, known as the "Young Man with a Glove;" habited in a black dress, with a dark and sober background, and no accessories whatever, this portrait, by its breadth of treatment and simple massiveness, is as grand as though painted by Michael Angelo; its steadfast, calm gaze transfixes the spectator, and, by the extreme reality of the impersonation, brings him, as it were, face to face with the young Venetian noble of 1500.

Many of our readers will probably remember the portrait, by Velazquez, of the "Conde Dague" (Olivares), in the Great Manchester Exhibition of 1857, which was a fine example of treatment, perfectly natural and unconventional. In the Madrid Gallery, the portraits of "Philip IV.," of "The Infante, Don Balthazar Carlos," of "The Conde Dague" (another), by Velazquez, and "Charles V." and "Philip II.," by Titian, are the perfection of the art, and merit the "Plus Oultre" of the great Emperor's legend. The *female* portraits of neither of these painters are equal to their male. The doñas of Spain were disfigured by tasteless exaggeration in dress, and the portly Venetian dames of 1500 were less propitious subjects for the pencil than the characteristic and marked countenances of their lords; but, although not so lovely as some of Reynolds's females, Titian's portraits of "Caterina Cornaro, Queen of Cyprus," in the Manfrini Palace at Venice; of "Titian's Daughter," in the Palazzo Barbarigo; the "Mistress of the Marquis of Guasto," in the Louvre; of "Eleanor of Austria," at Madrid, &c., are fine female portraits. Even were it within our means, however, a mere wood-cut would give little idea of the excellencies of these works; their great merits consist in the actual painting of the heads, &c., and nothing but a careful inspection of the *pictures themselves* can give the student a just appreciation of their transcendent qualities. The portraits of Reynolds are broad and fine in style; a great colourist, he is largely indebted to Corregio for the *gusto* of his heads; and the manner of treatment of the half-tones through which the eyes of the majority of his portraits are seen, originates with the great Italian. His style in this respect forms a striking contrast to that of Lawrence, who elaborates the details of the eyes of his portraits down to the minutest touches, and leaves nothing to the imagination of the beholder. The superiority of the former treatment may give a hint to photographers that mere detail is not only insufficient to please, but, carried to excess, is positively damaging to the work.

The engravings from Reynolds's portraits are numerous, and should be attentively analysed by the student; his few large historical compositions, spite of his admiration of Michael Angelo, are mean in conception: witness the "Riposo," in the National Gallery, and the engraving of the "Nativity," destroyed in the fire at Belvoir Castle, which is totally wanting in the first principles of composition. He has often introduced many accessories in his portraits, analogous to the pursuits of the person represented: thus, in the fine full-length of Sir William Hamilton, at Knole, he is represented in his study, surrounded by his books and the fictile ware of Etruria, of which he was the first great appreciator and collector. His portrait of John Hunter is another example of similar treatment, and such we conceive might be often successful in photography, since the lens executes such accessories with admirable facility. The lines of the composi-



tion are extremely simple; both arms leading, by their position, up to the head as the apex; the line of the chair and the knees forming the opposing secondaries; the table and chair,

and the side of the niche, the horizontals and perpendiculars. The effect is broad and masterly. Observe the manner in which the head is relieved, the high light on the forehead being opposed to the depth of the background, whilst the shadow-side comes off in dark from the half-tones, thus giving the greatest possible relief to the head. The catching *lights* on the glass vessels intensify, by contrast, the depth of the background, and are most useful. We observe comparatively a small portion of the figure in salient relief, and that only in the vicinity of the point of principal interest, the head; the other forms being nearly lost in the background, with the depth of whose tones they assimilate. Use is made of the books and papers on the table, to spread the mass of the principal light on the head, and to blend it *gradually* with the half-tones, waning off into darks. Thus, the highest light in the picture, to which all others are subordinate, is on the head; and it is kept from being a spot (and "spotty") by its diffusion, and being led out of the picture. In portraiture, light and shade play a most important part; we continually see it used to assist the lines of the composition, to suppress or tone down harsh angles, disagreeable forms, or commonplace costume. Profiting by its powers, Painting is more fortunate than her sister art, Sculpture, and thus often escapes the accentuation of the two cylinders of cloth on which, to the suppression of all form, modern male humanity is supported, and, with the corresponding black chimney-pot, will doubtless, to the unaccustomed of future generations, cause much hilarity.

The masterpiece of Greuze, the "Cruche Cassée," in the Louvre, an engraving of which appears above, is pretty and elegant in its treatment, and, at the same time, very regular in its lines. The crock and drapery form the base of the triangle of which the head is the apex; the contrasting lines of the arms are again opposed by the direction of the drapery and cruche. Greuze is a master whose merits consist in the extreme delicacy of the pearly tones of his colouring, and the elegance of his treatment; his pictures, as those of Watteau, were formerly comparatively neglected, and it has been reserved to the amateurs of our own time fully to appreciate the talents of both masters, and of late years enormous sums have been paid to secure the coveted possession of their works.

Rembrandt is a master whose portraits should be closely examined by the student; the finest of them have a vigorous execution which, with the brilliancy of their light and shade, make them almost startling in their truthfulness to nature. His etchings of portraits and other subjects are full of the highest artistic qualities, and no opportunity should be omitted of familiarising the eye with their excellencies.* Indeed, if the votaries of the camera would raise the practice of photography above the mere mechanism of successful manipulation, they must not neglect to closely examine all fine pictures, engravings, &c., and should consider a portfolio part and parcel of their apparatus, and by storing in it for study engravings† and photographs of fine portraits and pictures, the result will be sure to make itself felt in their works. The camera is capable of producing heads of the highest quality, and only requires judgment and taste in its management by the photographer.

(*To be continued.*)

PHOTOGRAPHY AND ITS APPLICATIONS.

As soon as the practical value of photo-zincography is fully realised, the applications of photography itself will be more widely extended. At present, almost limited to portraiture, with occasional excursions into the domain of landscape and architecture, it makes larger demands upon the artistic faculty than many photographers are competent to meet. But unartistic photographers must not despair, for other fields of usefulness await their cultivation, which need only to be ploughed by industry and intelligent application in order to yield a good harvest. Photographers will have to address themselves to the antiquary, to the librarian, to the curators of museums, to the legal profession, and to the engineer, machinist, and surveyor. To each and all of these photo-zincography offers peculiar and unique resources. A photographer attached to the British Museum might be well and constantly employed in copying rare and curious manuscripts, or in the preparation of a Manuscript Catalogue in *fac-simile*. The Record Office, the Patent Office, and many municipal libraries might also find constant employment for a photographer, whose productions would be readily purchased by the public, and the cost of producing them reimbursed. Legal documents, wills, &c., can be copied in *fac-simile* in a marvellously short space of time, and under such circumstances as would insure perfect secresy when desired. Certain documents exist, which are of so much value, that their loss by risk of accidents, such as fire, &c., would be productive of great inconvenience and injury, which risk could be fully obviated by the original being duplicated through the agency of photo-zincography. Such a duplicate would hardly be second in value to the original, and, in case of loss of the latter, might be accepted in lieu of it. At any rate, it might, in legal disputes, serve as evidence, in the absence of the original. By the nature of the process, the duplicate, if taken under proper supervision, would, to all intents and purposes, be identical with the original.

The resources this application offers to the engineer, architect, surveyor, and machinist, are self-evident; copies of plans, complex machinery, which require much time and talent on the part of the draughtsman, would be available as soon as wanted, and all delay, which is sometimes fatal to the interests of parties, would be avoided. Moreover, it is not only in the power of this art to copy, in *fac-simile*, but the copy may also be enlarged or diminished from the scale of the original. As soon as the various professions are satisfied of the resources offered by these important applications, the photographer will be an indispensable appendage to every lithographic establishment.

* In the print-room of the British Museum, one or at most two persons are all that ever, at one time, disturb its solitude. Compare the busy crowd of all ages, some in blouse, some in uniform, who throng the "Estampes" of the Bibliothèque Imperiale at Paris.

† All the masters whose works have been mentioned in these articles have been engraved from, and specimens of the works are obtainable with sufficient [illegible] either for mere inspection, or more permanent use.

We shall not content ourselves with merely pointing out these applications, but shall also show by what means they may be accomplished. To this end, we avail ourselves of the experience of the Ordnance Survey Office, where the art of photo-zincography has been matured and brought to its present state of perfection.

The magnitude of the works undertaken by the Ordnance Map Office is probably but little suspected by many of our readers. The original plans of the National Cadastral Survey are on a scale, for

Towns—of $\frac{1}{500}$, or 42 feet to an inch.

Parishes—on the $\frac{1}{2500}$, or one inch to one acre.

Counties—on the scale of six inches to one mile; and

The *Kingdom*—on the scale of one inch to one mile.

It is necessary that the town plans should first be reduced to the scale for the parish plans, then the parish plans to the scale of the county plans, and again the county plans to the scale of the general map of the kingdom. The arrangements by which the cost and time of these several reductions could be diminished, became an object of anxious consideration to the Superintendent of the Ordnance Map Office. It was obvious, that unless some more expeditious and economical method could be devised than by the use of the pentagraph, the publication of the survey on the several scales required would be spread over a period of time which would be most unsatisfactory to the public, both on account of the delay and the expense.

But this tedious method of making the reduction would also prevent that rapid disposal of the work as it was produced, which is essentially necessary in the conduct of a work of such magnitude as the National Cadastral Survey, on which each separate house and inclosure with its area must be given, to suit it for the important purpose of serving as the basis for the transfer and valuation of property, either in the towns or the rural districts.

To establish a comparison between the reduction by the pentagraph and by photography, it may be stated that in one year upwards of 3,360 plans were reduced from the larger to the smaller scales, of which 340 were plans of towns, which it would take many months to reduce by pentagraph to the three smaller scales. It would require at least sixteen of these instruments and forty draughtsmen qualified to use them with accuracy, and again to pen in the reduced plans with perfect accuracy and skill. But the very employment of so many draughtsmen with pentagraphs, and the great number of the large tables required for their use, would necessitate a great increase of office accommodation and superintendence, all leading to increased expenditure. These considerations weighed upon the mind of Colonel James, when he was in Paris, during the great Exhibition of 1855; and when he examined the various instruments for reducing maps, which were in the Exhibition, and the various methods for expeditiously and economically publishing maps, he could find nothing from which he could derive any advantage.

It was then determined to try photography, and England has the credit of being the first nation to make this important application of that art to the purposes of reducing plans. A photographic office was erected at Southampton, and since it has been in use, two sappers, with the assistance of two labourers, are able to make all the reductions required, and with such rapidity, that the publication of the survey on the several scales now proceeds simultaneously; and the one-inch map which is the last produced, is given to the public in three-fourths of the time that is occupied in producing the sheets of the general map of France.

Since the introduction of photography, the time of reducing the maps has been diminished from 4 to 1 in plans of rural districts, and from 9 to 1 for towns.

There is scarcely any limit as to scale to which the plans may be reduced by photography. Plans on the $\frac{1}{500}$ have been reduced to the 6-inch scale, which is a reduction in proportion of 21 to 1; these reductions are perfect, and may be traced and engraved from. The limit of the pentagraph is from 12 to 1.

The comparative cost of reduction must obviously vary with the amount of detail the plans contain. It costs no more, by photography, to reduce a plan of a town, with all its minute detail, than to reduce a plan of a barren waste, while by the pentagraph the details occupy an enormous amount of time. The actual cost of reducing from $\frac{1}{2500}$ to 6-inch scale per square mile, by photography, is 3*s*. 11*d*.; by pentagraph, 12*s*.; and for reducing from $\frac{1}{500}$ to $\frac{1}{2500}$ scale per sheet, by photography, 3*s*. 1*d*.; by pentagraph, 28*s*. 5*d*.

(*To be continued.*)

MR. HARDWICH ON THE MANUFACTURE OF PHOTOGRAPHIC COLLODION.*

PREPARATION OF COLLODION—(*continued*).

BEFORE passing on to the preparation of the collodion, it may be mentioned that the quantity of pyroxyline which I find it convenient to make at one operation is four times that stated. A double quantity of acids (36 ounces of sulphuric and 12 of nitric) is mixed in a jug, and poured out into the porcelain pots before mentioned. The first 300 grains of cotton are then immersed and left digesting, whilst the second similar portion is put into vessel No. 2. When the pyroxyline has been removed, the acids are emptied out, and a double quantity again mixed as before. At one time I adopted the plan of using the old acids again, by adding oil of vitriol to restore the strength, but afterwards discontinued it, as causing uncertainty.

The plain Collodion.—This is made by introducing half a gallon of alcohol of ·805 into a two-gallon stoppered bottle, and adding 1,900 grains of dry pyroxyline. When the pyroxyline has become thoroughly saturated with the alcohol, pour in half a gallon of ether of ·725, and agitate for two or three minutes; next add another half gallon of ether, and again shake the bottle for a few minutes. After this the collodion may be allowed to settle for about a week or ten days, when it will be sufficiently clear for use. The quantity of pyroxyline may be increased to 2,200 grains when a collodion of some body is required, or reduced to 1,800 for a thin collodion suitable for large plates. Supposing the height of the column of collodion as it stands in the bottle to be 10 inches, the sediment measured twenty-four hours after mixing is often about half an inch, but it settles down more closely at the expiration of a week or ten days. If the sediment should stand as high as 2 inches in the bottle, the collodion is probably of that kind which has been described as giving a soft negative with a tendency to white spots. The above point being of importance in a commercial point of view, I have taken pains to collect the sediment from more than two hundred gallons of collodion, and find that the loss does not exceed one pint in fifty. It appears at first to be much greater than this, but the residue continues to settle for many months, the clear collodion being occasionally drawn off from the upper part and added to the general stock, a small portion at a time. I have sometimes thought that the proportion of *undissolved* matter is greater when the pyroxyline has been dried by artificial heat; but I am not able to speak positively, since I usually dry by spontaneous evaporation.

On the day following the preparation of the collodion, about half of a fluid ounce may be drawn off by a pipette from the upper clear portion, and a minute piece of red and blue test-paper immersed for twelve hours. If, at the expiration of that time, the blue paper appears reddened, the pyroxyline was imperfectly washed; and the standard alkaline solution, which I shall immediately describe, is dropped into the plain collodion in the proportion of one full-sized drop to each half gallon. This addition of alkali is seldom required in my practice; certainly not oftener than once in twenty times. If, however, the pyroxyline be removed from the washing-tray at the expiration of twenty-four instead of

* Continued from vol iii. p. 357.

forty-eight hours, traces of acid are generally to be detected in the collodion. To make the standard solutions which are required, dilute the nitric acid of 1·45 with an equal bulk of water for the acid, and then dilute down the strong ammonia of commerce also with distilled water, until a fluid drachm exactly neutralises a corresponding bulk of the standard acid. With these two liquids at hand no further trouble will be experienced, since the quantity of acid left in the pyroxyline varies very little; and if any number of drops of ammonia be added in excess, a corresponding number of the acid liquid will neutralise them.

The Iodising Solutions.—There are three iodising solutions, made by the following formulæ:—

No. 1. (Potassium iodiser):—

Alcohol, ·817 at 60°	1½ gallon.
Iodide of potassium	3,200 grains.

It is necessary to pulverise the iodide very carefully, and to warm the spirit in a glazed covered saucepan to about 120° F.; after which, on drawing it off into a stoppered carboy, perfect solution will take place with ten minutes' shaking. Filter through pure bibulous paper.

No. 2. (Cadmium iodiser):—

Alcohol, ·817 at 60°	1½ gallon.
Iodide of cadmium	4,000 grains.

Dissolve in the cold; no pulverising required.

No. 3. (Bromo-iodide):—

Alcohol, ·817 at 60°	1½ gallon.
Iodide of ammonium	2,000 grains.
Iodide of cadmium	2,400 ,,
Bromide of ammonium	1,200 ,,

Pulverise and dissolve without heat.

The proportion in which these iodising solutions are added to the collodion is the same in each case—viz., two fluid drachms of iodiser to six drachms of collodion. They may be employed separately or in a state of mixture, but it is not advisable to add No. 3 to No. 1 in a proportion greater than one-fourth of the former, lest crystals of bromide of potassium should be precipitated.

(*To be continued.*)

ON THE TEMPERATURE REQUIRED TO RENDER BODIES LUMINOUS.

At the last meeting of the American Photographic Society Dr. Draper described the experiments he had made on the degree of temperature required to render bodies luminous.

These experiments were of two kinds: One, to determine whether all substances became luminous at the same degree, the other to determine what that degree is. The state of incandescence or ignition in chemistry, means that state when bodies begin to be luminous in the dark, without any change of substance, but simply a change of temperature; brick, for instance, or metal heated to a certain degree, emits light without changing its substance.

Experiments.—A common gun-barrel, with the barrel-hole stopped, had several substances—brick, plaster, gold, china, &c.,—placed within, where they were heated, and they were observed through the muzzle, when it was found that they all became incandescent at the same instant, therefore at the same temperature. For liquids, melted metals were employed, and gave the same results as solids, both becoming incandescent at the same temperature.

To determine the temperature, a platinum wire was made incandescent by a voltaic current, and the temperature was measured by a pyrometer. It was found to be 1·006° Fahr. Further, if the temperature was raised gradually, and the effect observed through a prism, the colours of the spectrum made their appearance in the following order, viz.: red, orange, yellow, green, blue, indigo, violet; and, when all had appeared, the body was of a white heat, the mixture of the colours producing white light. The photometric results were also remarkable, for at 1·000° a body emitted forty times as much light as at 1·500°. All those persons who had repeated the experiment perceived the bodies to become incandescent at the same temperature. There was no peculiarity in different eyes in this respect.

There is a photometric difficulty in the way of judging at what temperature bodies become incandescent in daylight; for if the amount of light were 64 times as great as that given by the body which would be incandescent in the dark, it would overpower the other so as to make the other imperceptible. Besides, the amount of light varies with so many circumstances, that any result obtained at one time would be useless for another. As to the nature of flame, it may be stated that it is perfectly dark in the central cone; then there is a shell of red light; next a shell of orange; then yellow, green, blue, indigo, and one of violet. The combination of all these gives a white light. If any particular rays predominate, through accidental circumstances, they will determine the colour of the light. The general yellow colour of common artificial light is produced by accidental circumstances. When a current of air is produced in the centre of a flame, there will be found two sets of luminous shells. Beginning at the centre, there will be found yellow; then green, blue, indigo, violet; then violet, indigo, blue, green, and yellow, the latter being on the outside. Hence the colours of such flames are always blue, there being two sets of blue rings.

ON SOME OF THE REQUISITES NECESSARY FOR THE PRODUCTION OF A GOOD PHOTOGRAPH.*

BY MR. S. BOURNE.

I have thus endeavoured, though very imperfectly, to carry out the object I had in view, which was to point out a few of the qualifications which I have found from experience the photographer must possess, as well as some of the requisites which are involved in the production of a good negative photograph. Other descriptions of photographs I have left unnoticed, neither did it come within the scope of my paper to enter on that great department of the art, the printing of positive proofs.

Before I conclude, permit me to congratulate the Society on the more hopeful and cheering character of its prospects. Our past history has exhibited but little progress, a dead weight has hitherto rested on our operations, and cramped our energies; but I am happy to think it is now in a fair way of being removed. The generous manner in which the committee of this Exchange has granted us the free use of these rooms, deserves our warmest thanks. I hope, as far as lies within our power, we shall endeavour to repay this generosity, by making the Society an ornament and an honour to the town, and useful in some way to its staple trades and manufactures. This, I firmly believe, is within the compass both of the Society and of the art. I am proud to say that we number amongst our members, gentlemen whose names rank high in the scientific and photographic worlds, and whose acquirements and productions are universally known and admired. We have, besides, gentlemen of eminent professional attainments, and others who take great interest in the practical development and application of the art. With such talent, it would be nothing to our credit if the Nottingham Photographic Society did not shortly rank as high as any in the provinces, whose proceedings are regularly chronicled in the journals.

As regards the art whose interests we are associated to promote, I conceive it is eminently calculated to be of service to the lace trade of Nottingham. Patterns of every description of lace goods—large or small—however elaborate, or however simple, could be obtained by its aid with a rapidity, a cheapness, and a precision unattainable by any other method. These put into the hands of a purchaser would possess great advantage over all drawings and litho-

* Concluded from vol. iii. p. 358.

graphs, on account of their superior accuracy and minuteness. In fact, to such a degree of perfection might they be brought, that the intending purchaser, by closely inspecting them, would be able to form some idea of the *quality* of the various articles submitted to him.

The objects of our Society, therefore, should be, to point out from time to time how photography may be of service in this and other ways to our own town; to spread a wider knowledge of its principles, and improve the character of its productions, as well as to contribute its share to the universal progress and future development of the art.

There is ample scope for us in each of these departments, and our favourite pursuit has a bright and promising future. Much as photography has already achieved, and marvellous as is the degree of perfection to which it has already attained, it is yet comparatively in its infancy; and if its future career is marked by the same brilliant success as that which has so wonderfully distinguished its past short history, what important results may we not expect from it?

It has already taken its place as one of the most useful and beautiful discoveries ever made. There is scarcely any department of art, science, or industry, in which it has not rendered valuable service. The painter has turned its inimitable "studies" to good account. The sculptor has welcomed its invaluable aid when, with its handmaid, the stereoscope, he has been enabled to contemplate, in all their solidity and life-likeness, those "master-triumphs of genius, consecrated by the taste of ages," which form his models; to realise the same advantage from which he would otherwise be compelled to visit nearly every city on the Continent, and spend months and years in studying and copying; and even then his drawings would lack that absolute exactness (on which to him their value chiefly depends), and, greater still, that relief and solidity, which he obtains in binocular photographs.

The astronomer, by its aid, has made the moon delineate her own surface, has registered the sun's eclipse, and measured the angular distance which separates some of the double stars.

It has copied for the antiquarian and the linguist—with a precision no hand can imitate—the inscriptions and hieroglyphics which cover the rocks, temples, and monuments of Egypt. It has brought to our own fireside pictures from every land; and the splendid monuments of Gothic architecture which adorn some of our own and many continental cities; the sacred spots of Palestine, Galilee, Bethlehem, Jerusalem, Calvary; the crumbling monuments and broken columns of Egyptian temples; the squalid-looking inhabitants and cities of China;—in fact, the grand features and general appearance of nearly every country are almost as familiar to us as though we had actually visited them. And one of the most recent and greatest of its triumphs has been to place within the reach of all—what *none* before could enjoy—exact and faithful copies of those grand cartoons of Raphael, which have long been the wonder, the admiration, and the envy of every true lover of the fine arts.

These are great and useful achievements, but I believe the future of the art is pregnant with still greater. I hope yet to see *photographs in natural colours*. If this great and sublime discovery is ever made (and who can doubt that it will?), it will produce a revolution in every department of the art. What has before been valuable, will now be doubly valuable. We now admire and highly prize the portrait of a friend—resembling life in every particular except the *colour;* but how shall we admire—how shall we prize it, when not only every minute feature and outline is reproduced, but when the very colour which beamed from the eyes, cheeks, and rosy lips, perhaps, of some *deceased* friend, beams from the impression they left behind? Certainly, as long as that exists, they will still live. If we have stood in rapture over a photograph representing some choice and lovely landscape, in which one colour only prevailed, what will equal our transports to see all the gorgeous hues and colours of nature radiating from the charming picture?

And if it is possible for any species of art—or, rather, if it is possible for any description of picture—to charm *every* eye which should behold it, and, as it hung continually before us, embody in itself the grand sentiment, "a thing of beauty is a joy for ever," such a picture, we may imagine, would be a photograph of large dimensions of some magnificent autumnal landscape, in which were combined every element of the grand, the picturesque, and the sublime, as seen in the bewitching light and soft effulgence of a gorgeous sunset, and in which (*i.e.*, the photograph) the wondrous *reality* of every colour, tint, and hue of the grand original was beheld.

Such are some of the objects, and such, I conceive, the sublime future, of photography.

CHLORIDES OF GOLD, AND THEIR EMPLOYMENT IN PHOTOGRAPHY.

BY M. FORDOS.

Photographers generally are of opinion that the best means of fixing positive proofs, and insuring their permanence, consist in the employment of the salts of gold; and it is principally by the beautiful researches of MM. Davanne and Girard, upon the changes positive proofs undergo, that the preparations of gold have acquired their due importance. Those eminent chemists have shown that the photographic image is produced by a layer of reduced silver; that the sulphuration of the silver is the principal, if not the sole, cause of the more or less prompt destruction of the proofs; and that it is possible to give stability to this layer of silver, by submitting the proof to the action of gold baths.

The gold baths employed in photography are prepared by adding to a solution of hyposulphite of soda either a solution of *sel d'or* (hyposulphite of gold and soda), or a solution of chloride of gold. But it is very judiciously urged that only a perfectly neutral chloride of gold should be employed, and acid chloride carefully avoided. Now, all the commercial chlorides of gold are more or less acid, and the constant presence of acid in these products—even the best prepared—has led me to think that there would probably be some interest in studying the preparation of this compound; and by this study I have, in fact, arrived at results which it will profit the photographer to become acquainted with. The mode of preparing chloride of gold, indicated in treatises on Chemistry, is very simple; but it does not yield a pure, neutral chloride of the formula $AuCl_3$. The following experiment will serve to explain the different phases of preparation, as well as the variable results to which they inevitably lead.

When 25 parts of gold are dissolved in a mixture of 25 parts of nitric acid and 75 parts hydrochloric acid, and the solution is evaporated by a gentle heat in a weighed capsule, the following facts may be observed:—The solution is of a yellow orange colour, and disengages abundant vapours of acid, until the liquid is reduced to between 51 and 52 parts. At this moment the liquid begins to deepen in colour, and the disengagement of acid vapours appears to cease. If we remove the capsule from the fire, the liquid soon becomes a mass of long, needle-like crystals. In this manner we obtain a hydrated hydrochloride of chloride of gold. If the capsule is not removed from the fire, and a gentle heat be continued, invisible acid vapours are slowly disengaged, but, at the same time, a portion of the perchloride is converted into protochloride; and in seeking by this means to relieve the chloride of gold of its excess of acid, we at length obtain a product which contains protochloride in proportion as the heat is continued. The chloride obtained under these conditions is of a ruby-red colour, more or less deep. It is not entirely soluble in water; and, when treated with that liquid, we see the protochloride of gold separate, under the form of a yellowish white powder; but this protochloride—by abandoning some of its gold—is not long in changing into perchloride. This experiment shows that, in the preparation of the chloride of gold, we find ourselves placed between two dangers: we obtain either an acid chloride, or a chloride containing some protochloride. Photographers should give up the use of chlorides of gold thus obtained, because they are of a variable composition; and, besides, they are constantly acid. We may also add, that they are so hygroscopic, that this property renders them of very difficult manipulation.

We believe that photographers will find many advantages in employing the double chlorides of gold and potassium and of sodium. These double chlorides contain as much gold as the commercial chlorides of gold, and may be employed in the same doses. They are neutral, and have an invariable composition. They possess great stability; and they do not attract moisture from the air. They may be bought in bottles containing 150 or 300 grains; and it will be easy to weigh out the quantity of salt required for any formula, without the fear of seeing the chloride liquify, and rendering the weighing difficult. The preparation of the double chlorides of gold and potassium, or of gold and sodium, is not at all difficult. (See p. 358.)

I shall now describe the chemical composition of gold baths, and explain the inconvenience of employing acid chloride of gold in preparing them.

Already, in 1843, M. Gelis and myself explained the chemical composition of the gold solution employed in photography. We recognised that the liquid contained—after the reaction of the two salts—a new *sel d'or* (hyposulphite of gold and soda), some *tetrathionate of soda*, chloride of sodium, and hyposulphite of soda in excess. Such is, in fact, the composition of a gold bath prepared with neutral chloride of gold and hyposulphite of soda; but, if we employ an acid chloride of gold, secondary reactions are produced, from whence many sulphur compounds result, which communicate qualities to the gold bath which are injurious to the permanence of the proofs toned in it. The acid of the chloride of gold reacts upon the hyposulphite of soda, and liberates hyposulphurous acid. One portion of this acid is decomposed into sulphur and sulphurous acid; but this decomposition takes place very slowly under the conditions in which it is placed. Another portion is changed into *pentathionic acid*, and, consequently, into *tetrathionic* and *trithionic* acids. The sulphurous acid—which arises from the decomposition of the hyposulphurous acid—itself reacts upon the hyposulphite of soda, and gives rise to some *pentathionate, tetrathionate,* and *trithionate;* so that the gold bath may become eminently *sulphurising*, and the more so in proportion as the chloride of gold employed is acid; for the hyposulphurous acid, and the *pentathionic, tetrathionic,* and *trithionic*, as well as the *pentathionate, tetrathionate,* and *trithionate*, possess the property of *sulphurising* silver.

From what has been stated on the preparation of chloride of gold, and the explanations given of the chemical composition of the gold bath prepared with an *acid chloride*, it follows that photographers must renounce the use of *acid chloride of gold*, which they have hitherto employed, if they wish to avoid having their proofs *sulphurised*.

The employment of the double chlorides of gold is much preferable; although, even with them, we cannot completely protect ourselves against every cause of *sulphuration*, as the baths prepared with these chlorides contain *tetrathionate* of soda, and this salt is a *sulphurising* compound.

The best means of avoiding *sulphuration* of the proofs, is to make use of gold baths prepared with *sel d'or*, hyposulphite of gold and soda; for these baths contain neither *free hyposulphurous* acid, nor *pentathionate, tetrathionate,* or *trithionate*, agents in the highest degree *sulphurising;* but as the *sel d'or* contains less gold than the chlorides, to obtain similar effects it is necessary to introduce into the baths a larger quantity of *sel d'or* than of chloride; for two drachms of chloride we must employ three drachms of *sel d'or*.

ON THE DETERIORATION OF THE NITRATE BATH BY ALBUMENISED PAPER.

BY J. B. CASSAN.

Albumen is rendered insoluble by heat, and by nitrate of silver; yet, in coagulating, the albumen leaves in the silver bath an organic substance, which gradually alters, and renders it useless in a very short time.

Whenever an albumenised surface is placed in contact with a nitrate bath, the latter becomes yellow, and, consequently, almost lost, if the albumen is not previously coagulated.

To lessen the deterioration of the silver bath, some operators place their albumenised paper under a protecting sheet of paper, and pass a hot smoothing-iron over it.

Others, with the same object in view, place the back of the albumenised paper upon boiling water. This is an excellent plan, in theory, but not practicable; for it is difficult to prevent the water reaching the albumenised surface, and the paper must be dried again before it is sensitised.

There is this inconvenience in employing the hot iron: if it be too hot, the paper is scorched; if it be not hot enough, the organic matter in the albumen will be soluble in the nitrate bath, and it is difficult to apply the heat equally all over.

An efficacious method consists in putting the albumenised paper into a vertical tin box, with a tight-fitting lid, and immersing it in a vessel of boiling water. The time of immersion is immaterial, as no injury results from its being prolonged. If the box be sufficiently large, one or more quires of paper may be prepared at once; allowance being made for the time necessary for the heat to penetrate the mass of paper.

Photographic Chemistry.

ACTION OF CHLORINE UPON NITRATE OF SILVER.

BY ALFRED NAQUET.

Chlorine was passed through a solution of nitrate of silver, until the latter exhaled a strong odour of the gas; it was then filtered through asbestos. The filtered liquid was coloured yellow by free chlorine, but did not contain the least trace of silver, as was proved by means of hydrochloric and hydrosulphuric acid.

It was left for twenty hours under the vacuum of an air-pump. At the expiration of that time it had lost all colour, and nitrate of silver gave no precipitate, which showed that it had parted with all its free chlorine; but it still exhaled a strong odour of hypochlorous acid, and deprived indigo of its colour; as the absence of the yellow colour excluded the possibility of chlorous acid, that of hypochlorous was established.

It remained to be seen whether chloric or even perchloric acid was produced. To ascertain this, the liquid was divided into two portions. The first was saturated with potassa, then placed in a *bain-marie*, and a current of carbonic acid gas passed through it for several hours. The gas, which at first gave off a strong smell of hypochlorous acid, at the end of the operation had lost all smell. The liquid had ceased to decolour indigo; the sulphurous acid not having given this property to it, it was concluded that it contained no trace of chlorate.

The second portion of the liquid was similarly treated by carbonic acid, and after being submitted to the action of this gas, it was evaporated to dryness and the residue calcined; the latter, dissolved in water, gave a solution which was not precipitated by nitrate of silver in presence of nitric acid. The primitive liquid, therefore, contained no perchloric acid.

Thus, in the action of chlorine upon nitrate of silver dissolved in water, chloride of silver and free hypochlorous acid are produced. Perhaps, if the liquids were more concentrated, chloric acid would be formed.

TO SILVER COPPER.

Take cyanide of potassium two drachms; crystallised nitrate of silver, one drachm; carbonate of lime (whiting), five drachms; mix intimately together in a mortar. Dip a moist rag into this mixture, and apply it to the copper surface, cleaned, which it is desired to silver; a very adherent coating is obtained.

(*To be continued.*)

Dictionary of Photography.

Methylated Spirit.—A mixture of 10 parts of purified wood-spirit with 90 parts of spirits of wine of sp. gr. 0·830. It is used as an economical substitute for alcohol in the preparation of varnishes, chloroform, ether, &c. There seems to be some objection to its employment in the manufacture of collodion, from the difficulty of obtaining methylated spirit pure, and of uniform quality.

Mica.—A mineral substance resulting from the decomposition of granitic rocks, gneiss, syenite, &c. It occurs in transparent laminæ, which are hard, flexible, and incombustible. Specimens are found in Siberia and the United States, which measure upwards of three feet square. It consists of a silicate of lime, combined with silicate of

alumina. Mica is a frequent substitute for glass, and is employed in photography as a recipient of pictures for lockets, brooches, &c.

Micro-photography.—This name is given to that branch of photography which consists in taking pictures of objects on so small a scale that the subjects can only be made out under a powerful magnifier. Although used chiefly as a toy, this application of the art of photography might be turned to useful account during a war, as communications could be rendered on a scale so small as to disarm suspicion and insure perfect secresy, even if the bearer were arrested.

Photo-micrography, as it is more properly termed, is an application of photography of the greatest scientific utility and interest: it consists in producing highly-magnified images of minute objects, as they appear under the high powers of a microscope. When combined with the magic lantern, the images are magnified to colossal proportions, and are used to illustrate lectures, &c.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 2nd April, 1860.

Photographic news is so scarce this week, and scientific information so dry, that I hardly know how to give my letter of to-day a proper tinge of interest. The last few meetings of the Photographic Society have been more than usually poor and devoid of interest—what little has been done I have alluded to in my hebdomadary epistles—and that often before it was well in print on this side the water. At the Academy of Sciences a long discussion, or rather personal dispute, has been raging now for many weeks between M. Delaunay and M. Leverrier, two of our ablest Parisian astronomers. I have carefully avoided all allusion to this, as I felt assured no scientific or other good was destined to come of it; indeed, it has now worked itself up into a purely personal affair, having begun upon the mathematical theory of the moon, and may perhaps end in a duel—such is, no doubt, the hope of those who, generally absent from the Academy, now throng its halls every Monday afternoon. As everything said by the members of the Academy is afterwards printed in the *Comptes-Rendus*, this publication becomes thicker and thicker—losing interest proportionately.

The President of the Academy, M. Chasles, a friend of Lord Brougham's, and one of the most distinguished mathematicians of the day, read, last Monday, an immense paper, entitled, "Resumé of a Theory of Homofocal Conical Spheres." It begins with the words, "Let us conceive, in a plane, a conical sphere C;" and ends with these, "One can pass from one proposition to another by the sole principle of *supplementary* spherical figures,"—occupying ten pages in quarto. A French author once exclaimed, "Mathematics are a fine thing" ("*Les mathematiques sont une belle chose!*") As for the paper of M. Chasles, a mother may permit her daughter to read it. I would not say the same of *all* French publications.

After this came a memoir by M. Marey, "Researches on the Form and Frequency of the Pulse;" the beating of the artery being registered by a new mechanical contrivance invented by the author (but of which he gives no description); by this instrument the beatings of the pulse are transmitted to a plate of smoked glass, moved by clockwork, upon which plate they are indicated by a multitude of curved lines; it is very curious to compare these curves when obtained from different persons. Their general form remains pretty much the same, but their shape differs very widely from one constitution to another. Next we have a long botanical memoir by M. Chatin—one of the few botanists who ever show their faces at the Academy; it is "On the Measurement of the Different Degrees of Organic Perfection in Vegetable Species," and forms the continuation of some researches commenced in 1855. This paper is essentially "dry." The author has endeavoured to show the value of characters deduced from the existence and symmetry of the axis and appendices of vegetables. The science of botany will doubtless remain, after this publication, in precisely the same state that it was before it.

This was followed by a paper by M. Gaston Planté, "On a New Secondary Pile of Great Power." The author has already shown the advantages of substituting lead for platinum in the applications of secondary currents to electric telegraphy, as proposed by M. Jacobi, of St. Petersburg. The new secondary pile is formed of ten elements (more or less), each element being formed of two long and wide plates of lead rolled into an helice, and separated by a coarse cloth, the whole plunged into water acidulated with sulphuric acid. This apparatus is brought into action by the current evolved from 5 Bunsen's elements; it acts as a condenser, and is capable of producing discharges equal to those of 300 Bunsen's elements employed without it. The usefulness of this paper will be readily appreciated by those concerned in electric or telegraphic undertakings.

M. Schlœsing makes known the results of his late *investigations on tobacco.* Certain leaves of tobacco are easily combustible, others only burn with difficulty—to the great discomfort of young smokers. M. Schlœsing has discovered the cause of this. The leaves that burn properly contain potash salts, and leave an ash, giving, on analysis, much carbonate of potash. The ashes left by incombustible leaves of tobacco give, on the contrary, principally sulphates and chlorides, besides much lime. Good combustible tobacco grows on soils containing plenty of potash; incombustible leaves are the produce of soils containing too much lime.

M. Mandl addresses a paper to the Academy, entitled "Researches on Pulmonary Osmosis." "The life of animals breathing in water," says the author, "is incompatible with the presence of a sweet substance in any lesser or greater quantity;" that is, if a solution of sugar be added to water containing fish, mollusca, &c., these animals die. The substances experimented on were cane-sugar, glucose, milk-sugar, &c.; they act with more or less rapidity, according to the strength of the solution and the species of animal submitted to their action. The living beings experimented on were infusoria, mollusca, annelides, crustacea, fish, and batracians. In these experiments the author establishes that death is not to be attributed either to absence of air, fermentation, or chemical action on the blood, nor to the viscosity of the liquid, but to an osmotic action (endosmosis and exosmosis) of the sugar solutions through the permeable membranes of the animal, and principally through the organs of respiration. This paper has a practical, physiological, and pathological bearing. It shows us how sweet substances, such as sugar, promote thirst, by absorbing the moisture of the alimentary canal; how sugar will act as an antiseptic or preserving substance, by preventing the development of microscopic organisms; the usefulness of sugar in dropsy; it explains, also, why persons suffering from diabetes are constantly thirsty, from the quantity of sugar diffused in their system, &c.

M. Isidore Geoffroy St. Hilaire having some time ago asked whether or no *bears* existed *in the mountains of Northern Africa*, M. Aucapitaine comes forward to-day and asserts, that in those parts of the African mountains he has visited, not only are bears unknown, but no word in the language of the natives serves to designate these animals.

The *Moniteur Scientifique* publishes a note by M. Jobard, of Brussels, on the great hygienic advantages to be derived from the introduction of pulverised charcoal into the mat-

trasses of beds. The idea has already been advocated by Dr. Guesneville, of Paris, that the use of *charcoal mattrasses* would prevent no end of disease in the more crowded parts of populous cities. They would prove especially beneficial in preventing puerperal fevers after confinement, &c.

The *Cosmos* of this week publishes a letter from M. Luther, the well-known astronomer of Bilk, announcing the discovery, at 11 o'clock, on the 24th of March last, of a new planet; it appears as a star of the 11th magnitude, and forms the 58th planetoid of the group existing between Mars and Jupiter. Here is its position:—

	Hours.	Mins.	Seconds.
24th March . . .	12 .	14 .	22·8 (mean time at Bilk).
Right Ascension .	12 .	1 .	53·72
Declination . . +	2° .	51 .	27·2

THE BLACKHEATH SOCIETY AND THE REPORT OF THE COLLODION COMMITTEE.

To the Editor of the "Photographic News."

Sir,—As Mr. Hardwich's letter—called forth by my remarks at the Blackheath Photographic Society—does not contain any attempt at a reply to any one of those remarks, I should not have troubled you with a rejoinder, had not Mr. Hardwich attributed to me words and sentences to which I never gave utterance.

I specially guarded myself against being supposed to give any opinion of my own on the value of the collodion. Let its value be ever so great, my objection—being to the principle of the report—remains the same.

Further, I never asserted that the attempt to find a definite formula for collodion had been a failure. On this question the report is practically silent. It tells us, indeed, of slight differences in the various samples of collodion made by Mr. Hardwich himself; but, in order to decide that a formula could give uniform results, it must be put into the hands of a number of competent persons; and if—independently, and without any assistance—they produce collodions exactly alike, it may be pronounced a formula giving definite results, but not otherwise.

I by no means wish to ignore the fact, that *since* the report was presented Mr. Hardwich has withdrawn from the manufacture of collodion; he was, nevertheless, the manufacturer of all the collodion reported on, and, moreover, though the *pecuniary* advantage may now go into other hands, the collodion is still Mr. Hardwich's, and is advertised under that name. I must, however, remark, that the words "indelicate" and "improper," though placed by Mr. Hardwich in quotation marks, are not mine, but are creatures of his own excited imagination.

When I said that I acquitted the members of the committee of intentional injustice, I considered that they were the only parties concerned. If it will better satisfy Mr. Hardwich, I will say that I acquit every one concerned of *intentional* but certainly not of *unintentional* injustice.

As Mr. Hardwich has evidently quite mistaken the meaning of my remarks, will you allow me to formulate in few, and, if possible, plainer words, the objections I made to the report?

1st. I object on principle to any scientific or semi-scientific society stamping any article of commerce as of superior excellence. When Mr. Hardwich can show that it is the object of such societies to interfere with fair trade competition, I will withdraw the objection.

2nd. Granting even the propriety of such a proceeding, it should, in common fairness, only be done after a careful comparison of all commercial collodions under precisely equal circumstances, which there is no pretence has been done.

3rd. The conclusions of the committee are opposed to the facts of the report. There are numbers of collodions in the market quite free from any of the faults found by the committee (not by me) with this collodion. How, then, can it be said, in general terms, to be of superior excellence?

In conclusion, I cannot but express my regret that Mr. Hardwich should look on every remark made on the report as aimed at himself. I, in common with all his well-wishers, desire to consider the committee, *and the committee alone*, responsible for the document in question.—Trusting you will pardon the length of this communication, I remain, your obedient servant, Charles Heisch.

Middlesex Hospital, April 3, 1860.

Miscellaneous.

New Artificial Gas for Lighting.—For many years it has been a favourite idea with scientific investigators, that our supply of gas would be derived from the most abundant source of hydrogen—water. The problem to be solved was, a cheap mode of decomposition; electricity being tried, was found too expensive. Some few years ago, it was asserted that our ocean steamers would no longer be under the necessity of carrying a cargo of coals for fuel, as they would derive it from the element they floated in—the ocean. If the idea was not then found practicable, the difficulty has now been solved by the application of superheated steam. There is no longer any doubt that the *Great Eastern* and other ocean steamers will be able to dispense with carrying coals for fuel, by deriving from the ocean ready and sure means both of lighting the vessel and obtaining any quantity of heat required. It will doubtless take twenty or five-and-twenty years to satisfy the practical world of this revolution in science; nevertheless, the accuracy of the fact, that both light and heat, in sufficient quantity and of excellent quality, may be obtained from the decomposition of water, cannot be disputed. An ingenious inventor, M. Isoard, aided by his son, obtains these marvellous results by means of a simple generator, a substitute for the boiler, which may be heated with the gas ultimately obtained from the decomposition of water. Water being injected into the generator in sufficient quantities at a time, is converted instantly into steam at a very high temperature, which is further heated by being passed through red-hot pipes, by which the oxygen is separated from the hydrogen. At the moment the superheated steam leaves the heating apparatus, under a pressure of seven or eight atmospheres, it is mixed with a determined quantity of coal tar, heavy oil of tar, turpentine, or any other liquid hydro-carbon; a series of decompositions takes place, which it is unnecessary to detail, but the result of which is the transformation of the hydrogen of the water and the hydrocarbon into a very rich illuminating gas. The gas is, however, first passed through a washing apparatus, where it is compressed under a pressure of several atmospheres and then collected in a gasometer, from which it can be distributed in the usual manner, wherever required. So marvellous is the whole process, that it is difficult to believe the evidence before our eyes; still, there is no resisting it. An apparatus occupying little more than a cubic yard in space, generates fifty cubic feet per minute of a very rich, white, intense gas, which burns with the greatest facility. There were many practical difficulties to be overcome, particularly that of charging the hydrogen with the proper quantity of hydro-carbon; and as the various specimens of coal-tar, &c., differ greatly in quality, it is necessary to test each experimentally, and to maintain the supply of the exact quantity necessary to charge the hydrogen so as to obtain a pure light from the mixture. The adoption of this mode of obtaining illuminating gas will effect many important beneficial changes in our social economy. Firstly, it will entirely free the public from the obnoxious gas monopoly, and all the concomitant evils of the present mode of supply, such as the infection of the soil of our streets with the most noxious stench of which it is possible to conceive; the breaking-up of our public thoroughfares every week or so; and the vexatious exaction of exorbitant prices for a bad article. The cost of the new gas, even under unfavourable circumstances, does not exceed fivepence per thousand feet. The apparatus is simple, portable, and self acting, and it may, with the gasometer for holding it, be readily ensconced in a coal-cellar; the internal gas-fittings at present in use being retained, all that is required is to cut off the connection with the companies' mains, and connect the supply pipes with our own gasometers.

Proceedings of Societies.

Photographic Society of London.

The ordinary monthly meeting of this Society took place on Tuesday evening, the 3rd instant, at the Society's Rooms, Coventry-street; Roger Fenton, Esq., M.A., occupied the chair.

The minutes of the last meeting having been read,

The Chairman put the question that they be confirmed, when

Mr. Malone interposed, and observed that at the last meeting a discussion was commenced on the subject of the report of the Collodion Committee. The discussion was interrupted by a suggestion that Mr. Hardwich's paper be first read, and it was read accordingly. At the close of the reading of the paper, when gentlemen who had reserved their remarks expected that the discussion would be resumed, the Chairman declared the meeting to be at an end. The Chairman did invite discussion on the subject of the paper; but, as there was an impression that the report would be separately considered, no response was made. The result was that the report had not been fairly disposed of, and no opportunity had been afforded Mr. Hardwich of replying to the observations which had been made. It was a question whether, before closing a meeting, the Chairman should not make it a rule to ask whether any gentleman had further remarks to offer on the subjects before the meeting.

Mr. Foster rose to order. The question before the meeting was simply whether the minutes were or were not correct. (Hear, hear.)

Mr. Malone considered that an opportunity should be afforded of replying to the remarks made as to the report. He put this request in justice to the Committee who presented the report. The fact that he had endeavoured to obtain a hearing on the last occasion did not appear on the minutes.

Mr. Foster said that Mr. Malone referred to what took place after the Chairman had left the chair; it could not, therefore, appear on the minutes.

The Chairman said it was not desirable to proceed with this discussion. There was no motion before the meeting. It was not his desire to interfere with the discussion of the collodion report, but he would suggest, if such a discussion were called for, that a separate evening be taken for the purpose.

Mr. Vernon Heath observed that if he remembered rightly the proceedings of the last meeting, the Chairman distinctly invited discussion after Mr. Hardwich had read his paper, and a pause of some length ensued without any response.

Mr. Malone said he would accept the suggestion of the Chairman, to take another evening for the discussion of the report.

After some further remarks,

The Chairman again interposed, and the minutes were put and confirmed.

The following new members were duly elected:—Rev. C. F. Boyle; Lord H. G. Lennox; W. H. Linton, Esq.; Frederick Cox, Esq.; John H. Dalmeyer, Esq.; and Thomas Clarke, jun., Esq.

A letter dated Zurich, March 7th, was read from Dr. Becker, who, at the former meeting, was elected an honorary member of the Society. Dr. Becker expressed in suitable terms his acknowledgments for the honour which the Society had conferred upon him.

The Secretary read a communication from Messrs. Murray and Heath, who had forwarded a specimen of a print from a dry collodion plate, sensitised last August. The plate had been exposed to a considerable degree of cold and damp during the winter, but did not appear affected by either. It had been kept in one of Messrs. Murray and Heath's air-tight preserving cases.

Mr. Shadbolt exhibited a new and simple method of obtaining instantaneous exposure, or exposure of a few seconds. The apparatus had been fitted by Mr. Melhuish to one of his metal cameras.

The Secretary read a communication from Mr. Sutton, in reference to his newly-invented Panoramic View Lens and camera, a specimen of which was exhibited. Having stated that Mr. Cox would explain the method of using the apparatus, Mr. Sutton went on to say that his No. 2 camera and lens, for pictures 7×3, could be carried in the coat pocket, and was suitable for taking instantaneous views of skies and waves. Artists travelling for the illustrated journals might use this camera, taking their pictures upon dry collodionised sheets of mica, of which a hundred might readily be carried in the pocket. The negatives, though not so perfect as those on glass, would be very useful to wood engravers. The size, 15×16, was suitable for amateurs who worked with the wet process in a small tent. Only a few glasses need be taken, as curved glasses were expensive, and negatives might be removed from the glass by drying and varnishing them with spirit varnish, and then applying to the film a damped sheet of gummed paper. This having dried spontaneously was then to be put into water and peeled off the glass. A satisfactory transposition of the picture was thus obtained, and a clean glass for another attempt. The lens he recommended as the best for paper pictures was 4in. diameter and 12in. focal length. With this lens paper negatives of the size of 25×10, the extreme size the lens would cover, could be taken in three minutes. The definition and achromatism of the panoramic lens were unsurpassed, since along the horizontal line of a view embracing 120° the definition was as good as in the centre of the best flat picture. If there was any defect at the sides of the picture, it was to be attributed either to an inaccuracy in the radius of the curved glasses, or the centering or mounting of the lens. No focussing was required. All objects upon a horizontal line, situated between a certain distance from the lens, and an infinite distance from it, were in focus, that distance depending upon the focal length of the lens, and the size of the stop. He (Mr. Sutton) had never found the use of focussing with any view-lens, and had worked for two years without altering the focus of his lens, the smallest stop having been his remedy for all optical as well as some chemical difficulties.

A second communication was also read from Mr. Sutton, on Panoramic and Plane Perspective. He stated that if a picture, including a very wide field of view, could be taken on a flat surface, the result would be, distortion of the objects at the side of the picture, which would appear misshapen, and disproportionately large. If it were possible to construct a lens to include a field of 120° on a flat surface, the result would be a caricature. On the other hand, panoramic perspective was suited for a wide angle of view, and a vertical cylinder, with the eye at the centre, formed the proper surface for receiving such a picture. If a panoramic picture were spread out flat, and the eye placed so far off as to include the whole at a glance, the spectator might be puzzled, did not the general character of the picture show that it was in ordinary plane perspective, and, consequently, not intended to be viewed in that way; yet, from the absence of any distortion, panoramic pictures, when flattened out, were not only interesting but artistic. If a crescent of regular houses were taken by a panoramic lens, and the picture flattened out, the effect would be the same as if the houses had been placed in a straight row, and taken upon a flat surface. It would, consequently, be impossible to tell how such a picture had been taken, unless a description were appended to it. Mr. Sutton's paper concluded by affirming that plane perspective for pictures, including a wide angle, was evidently wrong in theory, and panoramic, or cylindrical perspective, correct.

The Chairman then called upon

Mr. F. Cox, who explained the various parts of the apparatus exhibited by Mr. Sutton.

Mr. Mayall said, the public had been presented with a Comic English Grammar and a Comic History of England, and now it appeared that they were to have a Comic Camera. (Hear, hear.) The camera which had just been exhibited seemed to be constructed on the idea that they must ignore all focus, and that, in order to get things straight, they must do everything crooked. It should, however, be known that this invention was only a reproduction of a camera brought out in 1845 by M. Martin, and constructed by Messrs. Schiertz. The difference between that camera and the present one was, that M. Martin used flat plates with achromatic lenses. At that time, of course, daguerreotype plates only were used. After various experiments, M. Martin at length made his camera to turn on an axis, and the plate, at the time of exposure, was brought to meet the strongest portion of light in the centre of the lens. This plan might have been of some use, but the idea was not worked out to any practical result. He (Mr. Mayall) did not think extraordinary definition could be obtained by working with a curved surface, and with the form of lens now exhibited. He had not been able to follow Dr. Diamond in the communication he had read as concerning the principle on which the lens was constructed, but he considered that, in discussing a matter of this kind, they ought not to ignore the labours of previous inventors, who had walked in the same track. The fluid lens, also, was not new, for lenses of a similar kind had been made by the late Mr. Archer, and had been used some years ago, he believed, by Dr. Diamond. The only part of the invention which was new, were the curved surfaces

employed, to which he had already alluded. Since 1852, a considerable number of inventors had appeared, who apparently occupied themselves in reproducing old ideas in some slightly varied form. An invention, called Woodward's solar camera, had lately attracted considerable attention. In 1842 or 1843, Mr. Johnson, the maker of the reflecting camera, which he sold to Mr. Beard, had a camera almost precisely similar in construction to the solar camera. The claims of the early discoverers should not be forgotten when the Society was asked to lend its influence in favour of inventions brought before it. (Hear, hear.)

Mr. Malone could testify that M. Martin's camera produced the same results as that of Mr. Sutton. The latter had no focus at all; but M. Martin had a peculiar diaphragm, consisting of a slit behind the lens, so arranged, that, as the lens turned, the image of particular parts of the picture fell in turn upon the plate. It would be evident that if the mechanical arrangement were good, it would not be impossible to obtain a sharp picture by this means. If he might judge from the specimens exhibited in the room, such a result could not be obtained by Mr. Sutton's apparatus, and that gentleman's lens did not merit the flourishing account which had been given of it.

Mr. Shadbolt said, he came forward in a new character—that of defender of Mr. Sutton. There were quite sufficient objections to the invention without bringing forward others which really did not exist. In the remarks he was about to make, he would address himself to the paper which had been read. He must, in the first place, express his regret that so many assertions had been made without any proof being given. (Hear.) It was stated by Mr. Sutton that focussing was not necessary. That, translated into plain English, meant that with this lens he could not get a focus. If the curved plate were so arranged that certain objects in the field were in sharper definition, others would be thrown out of focus. Mr. Mayall was, however, in error when he said that there was no novelty in the invention. The construction of the lens depended upon the principle, that a sphere of glass could be so arranged as to have an absolute solar focus for objects at a long distance. In the camera exhibited, there was part of a cylinder adjusted for this purpose, in the hope that objects in the centre of the picture would be just so far forward as to be in focus. With such an arrangement, however, not many terrestrial objects would be in focus. Mr. Malone and Mr. Mayall had stated that with M. Martin's lens a sharp picture had been obtained. Perhaps, this was because he did not confine himself to a cylindrical plate, but had an arrangement by which his plate could be placed nearer to more distant objects in particular parts of the field. He (Mr. Shadbolt) saw in Mr. Cox's shop a negative which was described as being as good as Mr. Sutton could produce. A considerable portion of that picture was out of focus—just what might be expected from an examination of the lens, there being no means of correcting spherical aberration. If, however, Mr. Mayall would look at the lens, he would find that the arrangement of the diaphragm was absolutely new and ingenious. Its fan-like form cut off the feeble extremities of the picture, and secured uniformity over its whole surface.

Mr. Malone said, the point he had alluded to but omitted to explain was, that M. Martin had at the back of the plate a series of screws, in order to adjust it, and that he focussed with a slip of glass for each segment of the picture. He (Mr. Malone) admitted that there was a novelty in the diaphragm of Mr. Sutton's lens, and gave him full credit for it; but, at the same time, he contended that this arrangement must produce inferior results to that of M. Martin.

Mr. Heath congratulated Mr. Shadbolt upon the impartial spirit in which he had discussed this matter, and expressed his entire concurrence with what had fallen from the previous speakers.

Mr. Hughes said that, if exclusive merits were claimed for this camera, it should be tested in various positions. The whole point, as he understood it, for which Mr. Sutton contended, was a large angle; but, in an ordinary picture, that angle was as much vertical as lateral. If his practice were consistent with his theory, he would have given them a hemispherical picture as well as a hemispherical lens. Suppose, for example, that, in taking a picture, a church was in the way, what became of the spire? Would it remain *in nubibus*, or would the camera be turned on end? for this appeared to him the only way of getting over the difficulty. But, in considering inventions of this kind, difficulties of manipulation might safely be put aside. If the result were worth extra trouble and pains in manipulation, photographers would no doubt be found who would take that extra trouble and pains. But, in the present instance, there were no results exhibited worthy of the increased labour by which they were produced. On the contrary, there was nothing in the pictures exhibited to indicate that they were not produced by a very ordinary lens of a very ordinary camera.

Mr. Foster called attention to the passage in Mr. Sutton's communication, in which he stated that he had never found the use of focussing with any view lens, and that he had worked for two years without altering the focus of his lens. He (Mr. Foster) considered that the Society could not have much confidence in the judgment of a gentleman who had penned such a statement as that.

Mr. Sebastian Davies thought it probable that, in making that statement, Mr. Sutton referred to his own form of lens. Mathematically, the lens could only be regarded as radiating light from one point, and, consequently, focussing was inadmissible, as it would be impossible to alter the focus of one side without throwing the other out.

Mr. Mayall observed, that the lens was constructed just like the human eye. If the eye were fixed directly upon any object, that object was in focus; and the surrounding objects gradually more dim, according to their distance. It was certain that Mr. Sutton's lens could produce definition only in one plane, anything in front and anything on either side being out of focus.

Mr. Elliott had learnt from Mr. Ross that he had made an experiment with Mr. Sutton's other lens—the triplet, and found it to be a total failure.

After some further remarks, the subject dropped.

The Secretary then read a paper (communicated by Mr. Foster) on producing photographs on glass and porcelain in ceramic colours, by Mr. J. Wyard, of Bristol. A glass plate having been first slightly warmed, is covered with a solution of gelatine, gum arabic, and bichromate of potash, to which a few drops of honey syrup are added. The film having been dried at the fire, is exposed to good sunshine for a few minutes under a positive photograph. The ceramic colour having been finely ground, is applied to the surface of the film with a cotton pad, and the colour is found to adhere only to the unsunned parts of the film, forming on it a positive representation of the photograph which it is intended to copy. The film is then well washed with alcohol, to which a little dilute nitric acid has been added. As soon as the brown colour of the sunned portion of the bichromate film disappears, the plate is washed in pure alcohol, and dried rapidly. A flux is then applied in the following manner:—A solution of Canada balsam in spirits of turpentine is poured over the plate, which is then dried by heat, and the flux, consisting of borax and glass, or borax, glass, and lead, ground fine with water on a slab, and dried, is applied evenly with a cotton pad tied up in very soft leather. The plate is glazed prior to the application of the film.

Mr. Mayall said, that in 1850 M. H. Bulot communicated to him a process for burning-in photographs on glass or porcelain. At that time he went to see Dr. Diamond, who was developing pictures with protonitrite of iron, which produced a very silvery effect. He (Mr. Mayall) tried to transfer the film on to a piece of porcelain or very soft glass, and did twelve or fourteen portraits. He washed over the surface of the collodion with weak gum, pressed down upon it the piece of porous glass or porcelain, and, when dry, dragged it away. Upon this he then placed a very thin film of glass, such as was to be obtained at some of the photographic warehouses, and placed it in a muffle furnace. When the process was carefully done, the collodion became melted in between the very thin film of glass over it and the soft piece under it. Now, if a collodion, excited by iodide or bromide of cadmium, and transported on to soft enamel or glass, was burnt-in in the manner described, it became perfectly impervious to scratching, &c. He had an interview with Mr. Minton in reference to transferring copies of the old masters to vases, but he being much occupied at the time, nothing was done in the matter. He (Mr. Mayall) believed that M. Bulot had taken out a patent for this process. At all events, it was as well that the public should know what had been already done. It was surprising how much heat an ordinary positive could

stand in a muffle furnace, if excited with that iodide. The importance of this process to the arts need not be insisted upon, and the paper which had been read was no doubt a very valuable one, and deserved careful study.

M. Joubert said, that what Mr. Mayall had stated was doubtless very interesting, but it referred only to the transfer of photographs of one colour. His (Mr. Joubert's) process was of an entirely different character. It was done without collodion, and by its means photographs of every colour were produced. As he had not yet entered the specifications of his patent, he would, probably, be excused from entering into the details of the process. It had been grafted on to another process, of which he was under a promise to the Society to furnish some specimens, and these he was preparing as fast as possible. They would be ready for delivery in May.

Mr. Mayall said, the process to which he had referred admitted not only variety of colour but variety of backgrounds. He ground coloured glass into an impalpable powder, with which he coloured the photographs and then put them into the furnace. A chemical action took place, and they sometimes came out different colours from those which were put in. Sometimes, however, the colours came out right, and the process deserved further investigation.

Mr. Malone said, that as there seemed to be a desire to give credit to early discoverers, he might claim some small share, as the first person who ever attempted to burn-in photographs. With regard to heating a picture, if it were treated with silicates, the effect was very feeble, but if chromates were used, no difficulty was found in increasing the strength of the image. His (Mr. Malone's) object was to get negatives on porcelain, and as he had patented the process of burning them in, M. Joubert could only take out a patent for a special application of the process. The results, when chromium was used, were not so delicate as with silver, and were of a red colour; but the effect had been produced. The experiments were interrupted because Mr. Minton would not prepare porcelain for the purpose as he (Mr. Malone) required, by hydraulic pressure, making it into cakes and then baking it; the object being to obtain a material which was translucent and yet porous. In 1851, he was at Paris, and visited Sèvres. The director of that establishment, M. Edelmann, expressed full confidence that the process would be successful, and offered to place the resources of that establishment at his disposal; but political changes took place which affected M. Edelmann's position, and he soon afterwards died, so that the experiments ceased. They might, however, be resumed; and, if good slabs of porcelain could be obtained, pictures could at once be burnt in.

M. Joubert said, that what had fallen from Mr. Mayall and Mr. Malone only showed that for a number of years attempts had been made to produce pictures on glass or china. He had taken out a patent for transferring photographs, with two, three, or more colours in one picture.

Mr. Davenport said, that in the year 1847 or 1849, when Mr. Malone was making experiments in the manufacture of a superior paper, of uniform texture, for the Talbotype process, he (Mr. Davenport) suggested to him the probability of obtaining a negative image in bisque, which would obviate any imperfections in the print, arising from irregularities in the paper-negative. A premium was offered in the *Society of Arts' Journal*, at the time, for the best process of obtaining portraits on porcelain.

Mr. Malone could not trust his memory so far as to dispute what Mr. Davenport said, but he had no recollection of his having made the suggestion.

The Chairman moved the thanks of the Society, which he had no doubt would be cordially rendered, to those gentlemen who had laid communications before the meeting, or exhibited apparatus. (Cheers.)

On the motion of Mr. Mayall, seconded by Mr. Malone, it was resolved that at the next meeting of the Society the paper of Mr. Hardwich and the report of the Collodion Committee should be taken into consideration for discussion.

The Chairman announced that the next meeting would be held at King's College, and it was hoped that the President would take the chair.

Some pictures taken by Mr. Sutton's lens were exhibited, also some produced by the processes of M. Joubert and Mr. Wyard.

Mr. Manley exhibited a telescopic camera of his own construction, adapted to portraits and views of any size up to 14 inches square.—The proceedings then terminated.

Birmingham Photographic Society.

On Tuesday evening, March 27, the monthly meeting of the Birmingham Photographic Society was held in the Odd Fellows' Hall; and it having been arranged that a tournament betwixt the advocates of the "wet" and "dry" processes should take place on the occasion, the attendance was more numerous than usual. At a former meeting, Mr. Charles Breese, a distinguished local amateur, had let fall a casual remark, to the effect that he had never seen a really good picture—that is, one in which there were atmosphere, distance, and other artistic qualities—produced by the "dry" process. This remark drew forth a friendly challenge from certain "dry" professors, and Tuesday evening was appointed for discussing the merits of the two methods. Mr. Haines, one of the vice-presidents, occupied the chair. In support of his predilections for working with wet collodion, Mr. Breese produced a collection of his own instantaneous pictures, thirty or forty in number, including photographs of the sea in all its varied moods, pictures of cloudland, moonlight scenes, a view taken during the recent midnight eclipse of the moon, street scenes taken when Birmingham was *en fête*, architectural photographs, waterfall pictures, &c. The specimens evinced the skill of Mr. Breese as a manipulator.

Mr. W. B. Osborn admitted that nothing the "dry" process had done could approach these; but, to prove that both distance and atmosphere were compatible with the use of dry plates, he produced an album of fine pictures (Fothergill's process) belonging to Mr. S. Bourne, of Nottingham, and a series of paper slides published by Mr. Woodward of the same town. In the sense of distance they conveyed, one or two of Mr. Bourne's specimens were almost perfect; but in some cases it was remarked that where the distance was good the foreground was defective, as though the one had been sacrificed to the other.

A large number of specimens of what his plates were capable of accomplishing, were also handed in by Dr. Hill Norris, and many of them were full of fine effects. The dry pictures shown were mostly landscapes, and presented no cloud, sea, moving figure, or any of those difficulties with which alone the instantaneous process can cope. Mr. Breese's operation does not occupy the tenth part of a second; and Dr. Hill Norris said that if the dry process could be used with as much rapidity as the wet, he, as a chemist, saw no reason why equally good results should not be obtained with it. He was sanguine as to its being, ere long, made instantaneous. The evening, on the whole, was a deeply interesting and pleasant one; and Mr. Breese, in responding to a cordial vote of thanks, admitted that he had seen better dry pictures that evening than had previously come under his notice. A similar compliment was also passed to Dr. Hill Norris. By the aid of an achromatic stereoscope, recently patented by Messrs. Cutts, Sutton & Co., of Sheffield, the pictures were seen to great advantage.

Photographic Notes and Queries.

IMPRESSIONS BY CONTACT IN THE DARK.

Sir,—If you have not already received innumerable communications on the subject—which is very probably the case—I beg to trouble you with one more, on the photographic paradox of Mr. C. J. Busk, lately described at a meeting of the Blackheath Photographic Society, and detailed in your No. 81 for March 23rd.

After two or three quite successful attempts in following out the process, as there described by Mr. C. J. Busk, I placed a small photographic positive picture, on *albumenised* paper, on the excited paper of Mr. Busk, without any hope of obtaining any gradation of tone, or pictorial effect of light and shade as the result, but still with an expectation of some outline of the subject; when the paper darkened all over more quickly and more deeply under exposure to the sun than after *plain white* paper, without a trace of a picture of any kind. This soon brought me to the conclusion that the whole phenomena depended altogether upon the *kind* of surface to which the excited paper was applied, and without any reference whatever to its *colour*; and one more experiment at once proved this to be the true solution of it. The strong solutions used in exciting the photogenic paper will easily account for the chemical action set up between them and the *albumen*, or the sizes—whether animal or vegetable—when in close contact with English or French paper. The printers' ink (an oily compound), or other interposed material for marking or drawing on the paper to be copied, prevents this chemical disturbance from being set up on the excited paper. Dark marks by common ink,

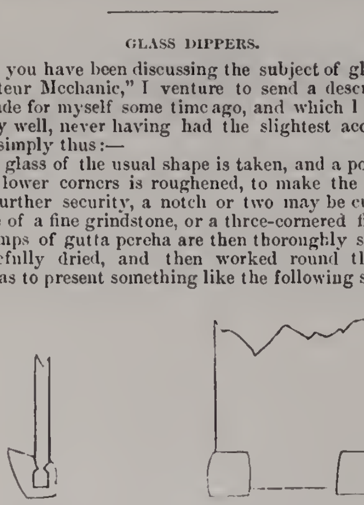
or other *undisturbing* compound on *white blotting* paper, produce no effects whatever; and the paper only discolours to the degree produced by the markings of a *printed paper*. A piece of printed paper, placed upon a larger piece of white blotting-paper, and the whole covered with the excited paper, shows the whole *rationale* of the affair at once; the darker tint from the white paper *not* covered by the printing, and *all* the rest, remain of the lighter shade of the printed parts, &c. The mysteries of bottled-up light, of Mr. Nièpce, as well as this very natural puzzle of Mr. Busk, may probably be alike explained by some chemical action set up, by previous contact of surfaces, &c.

Coldstream, N.B., April 1, 1860. EDWARD TOTHILL.

GLASS DIPPERS.

SIR,—As you have been discussing the subject of glass dippers in the "Amateur Mechanic," I venture to send a description of one which I made for myself some time ago, and which I have found to answer very well, never having had the slightest accident with it. It is made simply thus:—

A slip of glass of the usual shape is taken, and a portion of glass at the two lower corners is roughened, to make the gutta percha hold; for further security, a notch or two may be cut in the glass by the edge of a fine grindstone, or a three-cornered file. A couple of small lumps of gutta percha are then thoroughly softened in hot water, carefully dried, and then worked round the roughened corners, so as to present something like the following shape:—



Edge view. Front view.

When the gutta percha is cold, the line of junction between it and the glass is varnished with thin lac varnish, to prevent any fluid finding its way in, and loosening the one from the other. The contraction of the gutta percha on cooling is such that I have never found the slightest tendency in the caps to give way, or loosen, when a heavy plate is resting on them. Such a dipper as I have described combines the advantages of steadiness, the plate only resting on two points; non-retention of the bath solution, and so, avoidance of the line of stain at the bottom of a plate; a cushion to break the fall of the dipper on the bottom of the bath; and lastly, as the dipper is kept from contact with the back of the bath, it slides smoothly up and down, without scratching or getting scratched by small particles of grit getting in between the surfaces.

Oxford, February 26, 1860. GWENLLIAN.

POSITIVE PRINTING.

SIR,—Allow me to tender my best thanks for the letter from your valuable correspondent, "Θ," inserted in the "NEWS" of March 23; and to say, he will confer a favour not only on myself, but also on others, by giving, at his leisure, his experience in the negative paper processes.

Your correspondent, in his reply to my question on Mr. Wentworth Scott's positive-printing process, has misunderstood me. I agree with "Θ" that Mr. Scott's process, as a whole, is intricate and troublesome; but the point on which I was desirous of gaining advice was, is it advisable to add to the toning solution a certain quantity of solution of chloride of soda, or not? Before "Θ" replies to this, will he be so good again to read my letter in the "NEWS" for Saturday, or say No. 78, for March 2, p. 316.

Glasgow, March 30, 1860. GRATEFUL.

PHOTOGRAPHIC EXHIBITIONS.

THE following photographic exhibitions are announced for the coming summer in France and Germany:—

Strasbourg,	from	April 15	to	May 13.
Darmstadt,	,,	May 14	,,	June 8.
Mannheim,	,,	June 9	,,	July 4.
Stuttgard,	,,	July 5	,,	July 30.
Carlsruhe,	,,	July 31	,,	Aug. 25.
Fribourg,	,,	Aug. 26	,,	Sept. 20.
Mayence,	,,	Sept. 21	,,	Oct. 16.
Rouen,	,,	May 1	,,	June

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Tuesday,	April	10—Photographic Society of Scotland.
Wednesday,	,,	11—Chorlton Photographic Society.
Friday,	,,	13—Norwich Photographic Society.
Monday,	,,	16—Blackheath Photographic Society.
Thursday,	,,	19—South London Photographic Society.
Tuesday,	,,	24—Birmingham Photographic Society.
Wednesday,	,,	25—North London Photographic Society.
Friday,	,,	27—Photographic Society of Ireland.

TO CORRESPONDENTS.

W. N.—1. Because the positives are better from an unvarnished negative; and, where only a few proofs are required, it is better to print them before varnishing the negative. 2. There is no secret in the matter. Amateurs generally work timidly; professionals, with the boldness that experience imparts. The "peculiar tone" is obtainable by any one, although it is not exactly possible to say how; the temperature of the bath has much to do with it. The relief is obtained by strong solutions and deep printing, and ascertaining the precise moment when to stop; much also depends upon the negative. 3. When you mount a proof, damp the mount all over—on both sides, if you will—with a soft brush or clean sponge, and remove the surplus water with thick blotting-paper; then paste on the proofs. Let them dry with a quire of blotting-paper under a weight. The processes you allude to do not appear successful in the hands of many who have tried them. *Per se*, nothing can be simpler or easier than positive printing. A good negative, well printed, and toned in a solution of gold, by Mr. Maxwell-Lyte's formulæ; there is no complexity in this, nor need there be. The high gloss can only be obtained by the rolling-press.

AVON.—Dissolve 5 drachms of nitrate of potash and 1 drachm of nitrate of silver in 2½ ounces of distilled water, after the potash, is dissolved. Then add ½ drachm of iodide of potassium; a precipitate of iodide of silver will form: expose the mixture to the sun's rays for a few seconds, then pour it into 16 ounces of solution of acetous solution of sulphate of iron; this developer gives fine, pure whites in direct positives. The solution of sulphate of iron consists of a saturated solution of sulphate of iron, 20 ounces; Beaufoy's acetic acid, 2 ounces, filtered.

ARGENTUM.—Our plan is to return the sensitising bath every night into a stock-bottle, half filled with a solution of silver 40 or 50 grs. to the ounce, and filter before returning it to the bath. We have practised this method for some years, with success; our bath is never out of order.

PUER.—You should read some elementary work on chemistry, and become familiar with its nomenclature. There is no such thing as science for beginners. It is only by iteration that you can become familiar with the vocabulary.

MADRAS.—It is of no use to add chlorides to collodion; they are mostly insoluble in ether. Chloride of cadmium is slightly soluble, but it is precipitated after a short time, and renders the collodion turbid.

VIATOR.—If you know the focal length of your lens, you can easily calculate the size of the image, if you know the distance of the object. See "THE PHOTOGRAPHIC NEWS ALMANAC," 1860.

FOXTAIL.—Your lens has probably two foci—chemical and visual. After getting a good focus on the ground glass, screw it about a quarter of an inch nearer to the lens.

V. V.—Most of the faded pictures were toned in the baths made according to that formula, which displayed an extraordinary amount of ignorance of chemical reaction.

W. D.—The only remedy we can suggest, at present, is, that you should put your exposed plate into a bath of distilled water for five minutes previous to developing.

WELLS.—You seem to forget that every collodion plate immersed in the silver bath removes a portion of silver; consequently, your bath has become too weak.

MORTLAKE.—The silver nitrate should have been *re*-crystallised, until the crystals were quite clear and white. You had better repeat the operation.

CAM.—We do object to such a term as "pistolgraph." You require a good light, a "quick" lens, and neutral chemicals.

DELTA.—The turpentine waxed-paper process, as described by the Rev. J. Lawson Sisson, yields very beautiful results.

MELLOR (Ryde).—The waxed-paper process will best suit your purpose. It has been fully described in this journal.

RICHMOND.—Your acid is, doubtless, adulterated. Obtain a fresh supply from a chemist—not an apothecary.

B. P.—Oxymel is made with honey, 5 pounds; acetic acid, 7 fluid ounces; distilled water, 8 ounces.

EXCELSIOR.—There is nothing better than chloride of lime for removing silver stains from the hands.

R. S. T.—You can buy yellow glass baths at most of the dealers in photographic apparatus.

AN EXHIBITOR.—There has been no photographic exhibition at the place named since 1854.

S. S. S.—Use a smaller diaphragm, and avoid reflected light from the surface of the print.

L. M. H. G.—Add crystals of nitrate of silver to the quantity of water indicated.

ALICE.—Add a few drops of glycerine to the solution of gum: it will not chip off then.

CARBON.—Carbon-printing cannot be said to be commercially successful at present.

BLUE JACKET.—Mr. Maxwell-Lyte's toning-bath is the best for your purpose.

VIOLET.—The difference is not so great as to justify the increased expense.

CUBIT.—Benzole or camphine are good solvents of gutta-percha.

W. W.—You must obtain a lens of shorter focus.

COMMUNICATIONS RECEIVED.—A Photographic Tour in the Vale of Neath (conclusion).—Polarised Light.—An Absent Member of the N. L. Association.—Alpha.—J. F. T.—Persevere and Prosper.—Oxoniensis.

$_*$ All editorial communications should be addressed to Messrs. CASSELL, PETTER, and GALPIN, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

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Notice.—The continuation of the series of articles by Mr. Lake Price will be found on page 384.

PHOTOGRAPHY AND ITS APPLICATIONS.*

The idea of reducing maps and plans by means of photography is of long standing, and has been suggested by several persons; but it does not appear that the notion was practically worked out before 1855 by Colonel James.

It must not, however, be supposed that the first attempts at reduction were as successful as they now are. Daily experience led to the devising of means for simplifying and economising the labour of reduction, and the cost has been proportionably reduced also.

As, in each portion of town or country, the plan is plotted only on the largest scale on which it is to be drawn, it is obvious that a very great number of the plans given to the public are obtained by reductions from larger to smaller scales. We will now describe the apparatus, to insure accuracy and rapidity in working, the process, and the building in which it is carried on.

REDUCTION OF PLANS DEPENDING ON OPTICAL LAWS.

The reduction of plans from larger to smaller scales is regulated by the law, that the scale of the image formed by the lens is to the scale on the plan as the distance of the image from the lens is to the plan from the lens. (*See fig.* 1.)

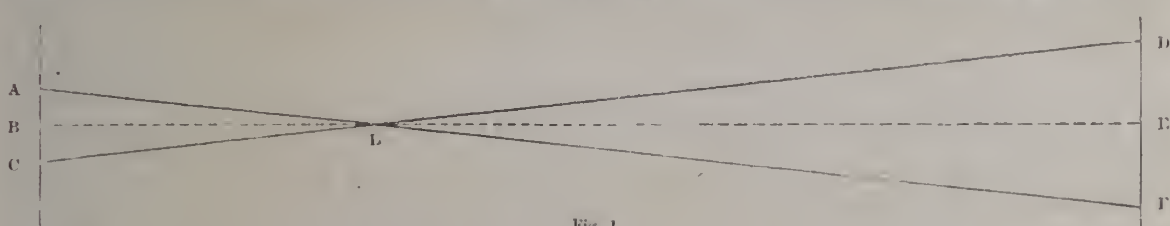


Fig. 1.

That is to say, L being the lens, A C the plan, and D F the image, D F is to A C as E L is to L B. It would only be necessary, therefore, when reducing plans from one scale to another, to place the lens in such a position that the distance E L and L B should be to one another as the scales.

Various circumstances modify this law as applied to the lenses actually used.

Those which the photographer has principally to deal with, when working with the best achromatic lenses, are spherical aberration and curvature of the image. When reducing plans, these influencing causes are of particular importance. The usual remedy is to place a stop $4\frac{7}{8}$ inches, in front of the lens, and $\frac{1}{4}$ inch diameter, which has the effect of diminishing the curvature to the extent of rendering it inappreciable.

The curvature increasing very rapidly with the obliquity of the pencils, there is a limit to the size of the plan which can be reduced from one scale to another without sensible distortion; and there is also a limit to the size of the image which can be taken free from perceptible distortion. The largest plans reduced measure 38·016 inches × 25·344 inches; and no negative is taken of a greater size than 9 inches × 6 inches. When the reduction is not so great in degree as to allow of the whole plan coming within these limits, it is subdivided by pencil lines into rectangles, so that when reduced they shall occupy the area of 9 inches × 6 inches on the negative, and each rectangle is photographed separately, and the prints mounted together afterwards.

In practice, the operation resolves itself into adjusting the camera, so that the image as seen on the focussing-glass shall occupy the area which the plate to be photographed would do when reduced to the smaller scales. In order that this may be done, a rectangle is ruled on the ground-glass of the camera, representing the area the plans should occupy when reduced to the smaller scale, and the plan and camera are so adjusted that the margin lines of the image of the plan lie exactly on the lines ruled on the ground-glass.

Necessity for the use of Mechanical Contrivances.—As each plan successively photographed cannot well be fixed on the board in exactly the same place, and as the reductions are required to be made in different proportions, it is necessary to provide mechanical contrivances to enable the operator to adjust each plan to be photographed both rapidly and accurately.

The following are the arrangements which are found to answer remarkably well:—

The Camera.—The camera is made of mahogany, strongly bound with brass, and is provided with an endless screw to adjust the focal distance. The construction and dimensions are shown in Figs. 2, and 3.

The Lens.—The lens is an achromatic meniscus, or concavo-convex, $3\frac{1}{2}$ inches in diameter, 25-inch principal focal length, with a rack and pinion for adjusting the focus.

The Camera Stand.—The stand on which the camera is supported is of simple construction. It is necessary that it should possess the means of giving to the camera a motion through small arcs of altitude and azimuth, and a sliding rectilineal motion in a direction at right angles to the optical axis of the lens. The construction is such as to admit of these movements. (See Figs. 2, and 3).

The top of the stand consists of two separate portions: the lower, a strong board working on a transverse axis, which rests on the frame of the stand, and clamped at any required altitude by four screws, biting four hinged plates, which connect the top of the stand with the frame. The amount of motion is regulated by an elevating screw.

The upper board on which the camera is placed is connected with the lower one by a central pin, which passes through the top, and works in a socket in the lower board.

Through the latter an arc of a circle is cut, and a screw, passing upwards through the arc, and fastened to the lower surface of the upper board, gives the means of clamping the top board in any portion of the azimuthal arc it describes on the centre pin, its motion being, of course, limited by the length of the arc cut in the lower board.

V-shaped grooved plates of brass are let transversely into the top surface of the stand; and to the bottom of the camera are screwed similarly shaped brass runners, so that when the runners are fitted into the grooves, the camera lies

* Continued from vol. iii. p. 369.

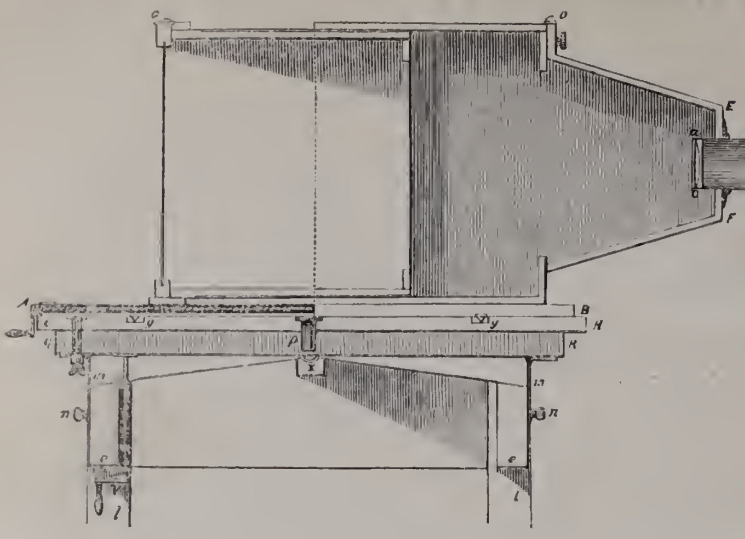


Fig. 2. Section and elevation of camera and stand.

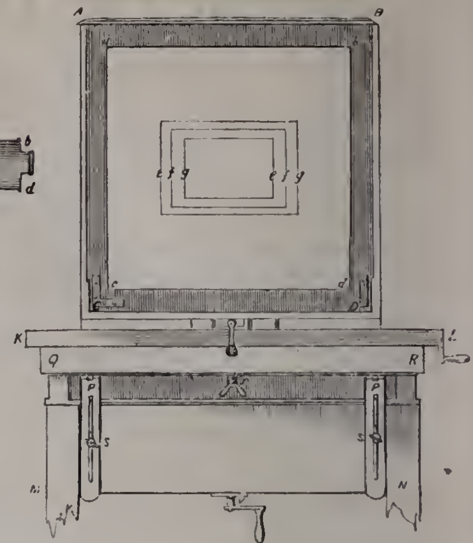


Fig. 3. Elevation of back of camera and stand.

A B C D E F. The camera.
G H Q R. Top of stand.
G H. Upper board.
Q R. Lower board.
a b c d. Lens and mounting.
g g. V-shaped runners working in V grooves.
k. Circular arc cut through the lower board.
l. Portion of legs of stand.
m m. Hinged plates.
n n. Screws for clamping plates.
p. Centre pin on which upper board works.
r. Screw passing through circular arc clamping upper to lower board.
s s. Endless screw for focussing.
v. Elevating screw for giving top of stand motion on axis *x*.
x. Axis of top of stand.

A B C D. Movable slide, containing focussing-glass.
a b c d. Ground-glass plate for focussing.
e f g. Rectangles ruled on ground-glass to be made to coincide with margin line of plan according to nature of reduction, *e* 1-2500th to 6 inches, *f* 1-500th to 1-2500th, *g* 6 inch to 1 inch.
K L M N. Stand for camera.
P P. Plates to allow motion in altitude.
s s. Clamping screws for ditto.
Q R. Lower board.
r. Screw passing through circular arc, clamping upper to lower board.
V. Screw for giving top of stand motion in altitude on axis.

SCALE ONE INCH TO ONE FOOT.

symmetrically on the stand, and can be made to slide with an easy motion in a transverse direction; the motion being given by a male screw likewise let into the surface of the stand, and working in a small female screw socket attached to the bottom of the camera.

Each of the legs of the stand has a groove at bottom to fit the convex surface of the rails on which it slides.

(*To be continued.*)

ACTION OF IODINE UPON NITRATE AND OXIDE OF SILVER.

BY ALFRED NAQUET.

Iodine in excess was first made to act, cold, upon nitrate of silver. The insoluble deposit was separated by filtration from the rest of the liquid, which was put to digest with oxide of silver; the precipitate formed was added to the first.

The latter was exhausted by alcohol to remove the free iodine, then boiled with a solution of pure potassa, which blackened it. After a short ebullition, it was filtered. The liquor collected was rendered blue by the simultaneous action of starch paste and sulphurous acid, but it did not turn blue when chlorine was substituted for the sulphurous acid. Upon cooling, it deposited an insoluble salt, which possessed the characteristics of iodate of potassa, and which was in too small a quantity to analyse.

The deposit upon which the potassa acted was formed of a mixture of oxide and iodate of silver, which were separated by weak nitric acid.

The first experiment tended to prove that in the action of iodine upon the nitrate of silver (or, what is the same thing, upon the oxide of silver) there is a production of iodic acid and of iodide of silver. However, as the iodate was separated only by the aid of boiling potassa, it must not be supposed that it first formed a less oxygenized compound of iodine which was decomposed under the action of that reagent. Therefore the experiments were recommenced in the following manner:—

Iodine was made to act at boiling temperature upon oxide of silver delayed in water; these two bodies having only a feeble action upon each other when cold. When the reaction was finished, the compound was filtered. The liquid was acid and coloured yellow by free iodine, which the excess of acid prevented from colouring starch blue. This colouring appeared on the addition of sulphurous acid, and not upon the addition of chlorine; another portion of the liquid evaporated in vacuo left a white hygrometric mass, which answered to all the reactions of iodic acid.

The argentine precipitate ought to have contained iodate of silver, if the first experiments were correct. As there was reason to fear that this acid was produced in the first experiment by the action of the potassa on a little iodine that had escaped the alcohol, it was sought for by another process.

In the preceding experiment it is evident that the iodide of potassium was sufficiently free from iodate as not to colour starch blue by the addition of sulphurous acid. It acquired this property and became charged with iodic acid by means of double decomposition when the solution was boiled with iodate of silver.

Turning this reaction to account, the solution was boiled with an aqueous solution of iodide of potassium, and the filtered solution was found to contain an iodate by means of starch and sulphurous acid.

In the action of iodine upon oxide of silver, iodide of silver and iodic acid are formed. If the oxide is in excess, all this acid is in the state of iodate of silver; if, on the contrary, it is iodine, a part of the acid is set free, while the remainder rests combined with the oxide of silver.

To account for the production of free iodic acid, the iodate of silver was treated with iodine, and, under these circumstances, iodic acid was set free.

Certain phenomena observed led to the examination of the action of nitric acid with 4 equivalents of water upon iodide of silver, iodate of silver and the mixture of these two salts, as well as that of potash upon the two first. It resulted :—

1. That the iodide of silver is decomposed by boiling nitric acid, with the production of nitrate of silver, and the disengagement of iodine.

2. That the mixture of iodate and iodide neither facilitated nor delayed this decomposition.

3. That iodate of silver dissolves without change in boiling nitric acid.

4. That caustic potassa, even when cold, decomposes rapidly iodate of silver, forming iodate of potassa and oxide of silver.

5. That potassa in the cold does not attack iodide of silver, and very imperfectly when hot.

MR. HARDWICH ON THE MANUFACTURE OF PHOTOGRAPHIC COLLODION.*

PRECAUTIONS TO BE OBSERVED.

At the risk of appearing prolix, I have decided on calling attention to certain minor details of manipulation, which are in themselves simple, but may be unknown to some who may yet wish to carry out the instructions contained in this paper.

Beginning with the cotton, which we suppose to have been previously cleansed by potash, it will be necessary to dry it very perfectly before using the acids, since the quantity of water which I have given in the formula is so great, that any further dilution would certainly ensure the destruction of the fibre by the nitrosulphuric acid. The cotton may be dried near the fire, or upon the steam-bath before mentioned; and, when once dried, it must not afterwards be left in a damp place.

In mixing the acids, it simplifies matters to select a stoppered bottle which holds very nearly the proper quantity of oil of vitriol when filled quite up to the neck. The nitric acid and the water may be measured in a narrow cylindrical hydrometer glass; a mark being made for the former with black varnish, at a height corresponding to one-third of the bulk of the oil of vitriol, and a second mark lower down for the water, the quantity of which will vary according to the strength of the acids. Before using these measures, always invert them, and allow the drainings from the last operation, consisting of acid diluted by absorption of atmospheric moisture, to flow out. Then measure the oil of vitriol, and make a leaden counterpoise for it in the scales, bottle included. This is necessary when perfect accuracy is desired, since otherwise the nitrosulphuric acid will be stronger in winter than in summer, which I have found to be the case to a noticeable extent; the product of pyroxyline obtained from 300 grains of cotton being 50 grains heavier in frosty weather than during the hot months of June and July. It is not absolutely necessary to weigh either the nitric acid or the water; and, with regard to the sulphuric acid, the plan which I have adopted has been to measure it as a rule, but to put the bottle afterwards into the scales, if a sudden change of atmospheric temperature takes place.

A failure would certainly be produced if the three constituents of the nitrosulphuric acid were not properly mixed; but there is no difficulty in effecting this by stirring with the broad spatula for half a minute in a shallow vessel. In the deep porcelain pots before spoken of, it may not be quite so easy, and thus it is advantageous to adopt the plan which I have usually followed of mixing a double quantity of acids at one time in a jug, and pouring it afterwards into the pots. The sides of the jug, however, must not be too thick, or the temperature will sink below 150° in very cold weather, especially when the sulphuric acid is a little weaker than usual, or the mixture is kept too long in the jug.

Some may perhaps be inclined to keep a portion of the nitrosulphuric acid ready prepared, and to obtain the correct temperature by mixing cold acid with the hot. If so, they should bear in mind that a stoppered bottle must be used, since nitro-sulphuric acid, like oil of vitriol, absorbs water from the atmosphere. On one occasion some experimental results were completely spoilt, by leaving the acid for a few days in a beaker covered by a glass plate; the upper part became so far weakened that, on putting in the cotton, it instantly dissolved.

Taking the temperature of the acids is an operation of some nicety, and especially so in cold weather. Begin by stirring briskly with the glass spatula in a circular direction; then dip the thermometer exactly into the centre of the liquid, and hold it in that position for at least a minute, since the rise of the mercury, although rapid at first, may be very slow towards the end. If the acid be too hot, it can be cooled two degrees, by taking a cold spatula and stirring it for a few seconds; therefore it is of consequence that the spatula which is used to immerse the cotton should be previously warmed by dipping it in the liquid. The acids also must be at least 165° F. when they are first placed in the porcelain vessel, otherwise its thick porcelain sides will reduce the temperature so rapidly that, although the thermometer may indicate 150° F. at first, it will soon fall, and the weight of the resulting pyroxyline will be greater than that indicated for a given strength of acids. In order to obtain a uniform temperature during the time that the pyroxyline remains immersed, I invert large jars upon the porcelain pots, and keep them covered, so as to prevent the cold air from blowing on the sides.

The boy who weighs the cotton into pieces of 30 grains each, is directed to pull out each piece thoroughly, and work it with his fingers into a circular form, to facilitate absorption of the acid. In pursuance of the same object, each piece, as it is placed in the acid, is carefully pressed with the spatula against the side of the vessel; and in order that the last pieces may not be at the top (in which case they always come out less broken than the others), a *well* of acid is kept free by means of the spatula, and these last pieces are pushed down nearly to the bottom. When all have been immersed, the mass is squeezed against the vessel, first on one side and then on the other, for more than a minute, after which the whole is loosened by letting the spatula down to the bottom, and raising it up until the pyroxyline nearly fills the liquid; the vessel is then covered up and left for eight minutes, as before said. I think it of consequence not to finish the process of putting in the cotton by pressing it down to the bottom in a hard mass, because a good deal of solution always takes place in the acids, and this is attended with an evolution of *heat*, which increases the disintegrating action on the cotton. The object, therefore, is to prevent the mass from "heating" as far as possible, by loosening it out with the spatula, and diffusing it through the liquid. Observe, however, that the cotton must not be permitted to project above the surface into the air, or oxidation and evolution of red flames will take place. These little matters may seem unimportant; but, unless they are attended to, no two portions of pyroxyline will correspond in weight.

I employ both spatulas in removing the pyroxyline from the acids, forcing them down to the bottom on opposite sides, and then bringing them together, so as to pinch the mass and lift it out entire. In squeezing the acids away no time must be lost, or the action of the air may produce oxidation and red fumes. A few seconds will be sufficient, and especially so if great pains be taken to distribute the pyroxyline through the water by catching it with the gloved hand. A sensation of heat is felt at first, due to dilution of the oil of vitriol; but this soon ceases, and the chance of failure from that cause is very slight. If the material, how-

* Continued from vol. iii. p. 370.

ever, were simply thrown into a small quantity of water, and allowed to remain, the rise of temperature might be sufficient to cause solution.

I was not without hope at first that the waste nitro-sulphuric acid—which one scarcely likes to throw down the sink, lest it should act upon the leaden pipes—might be useful for some other process. In this expectation, however, I have been disappointed, since the pyroxyline which it contains in solution appears to interfere with its application to any such purpose as dissolving metals, &c.

I will here remark upon the importance of rejecting any pyroxyline which turns out unsatisfactorily; perhaps from the cotton having been laid on a wet board, or left too long in the acids, &c. If any such accident happened in my practice, the whole batch was at once thrown down the sink, since collodion is an expensive material, and one of too much consequence to be trifled with.

At first I was in the habit of placing the pyroxyline in the gutta-percha washing-dish immediately on taking it from the acids; but, finding that the heat and acid together gradually decomposed the gutta-percha and made it sticky, the plan was adopted of throwing the soluble cotton first into a leaden sink, and, when the greater part of the acid had been removed by a few hours' washing, lifting it out into the gutta-percha dish.

The gutta-percha washing-tray will require cleansing after a week or so; a deposit adheres to the bottom, which seems to consist of matted fibres of partially-dissolved pyroxyline. This material having been some time in the water, might, perhaps, decompose and liberate oxides of nitrogen in collodion. I am careful, therefore, not to disturb it at first; and, when sufficient has collected, it is scraped out, and the tray washed with water.

It is better not to complete the washing of the pyroxyline with boiling water, nor to use any carbonated or caustic alkali to remove the last traces of acid. All alkalies tend to decompose pyroxyline, and remove a portion of the peroxide of nitrogen in the form of nitrite; and although I am aware that dilute ammonia is commonly employed to neutralise the acid, I have long discontinued its use, finding that some varieties of pyroxyline assume a yellow colour, and become more unstable in collodion when previously treated with ammonia.

The pyroxyline may be prepared in small quantities at a time, as required for use; but if it be necessary to keep it in stock (which I myself have never done), it should be dried either over oil of vitriol, or at a temperature below 120° F. Mr. Hadow mentions 140° F. as the point which ought not to be exceeded. Probably something depends upon the particular variety of pyroxyline; and with some kinds I have seen red fumes given off, on placing the material in a covered tin vessel surrounded by boiling water. Pyroxyline for keeping ought also to be put away in a dry place, and excluded from the light, since this substance is known to be liable to spontaneous change; and unfortunately, the exact conditions of permanency have not been ascertained.

Having completed the preparation of the pyroxyline, this list of "Precautions" is nearly at an end: a few words on the subject of plain collodion will close it. When first I commenced the manufacture, I employed glass carboys for holding the collodion, but afterwards rejected them for two reasons: partly because the shape is inconvenient as regards the deposition of the sediment; and secondly, the glass, being sometimes badly annealed, has been known to yield to the inside pressure in hot weather. For the last two years and a half I have substituted narrow-mouthed stoppered bottles, holding two gallons each; they may be obtained of Messrs. Brown and Co., of Farringdon-street.

There is a decided advantage in placing the alcohol in the bottle before the ether, not only in facilitating the solution of the pyroxyline, but also in enabling the operator, by shaking the bottle, to remove a flocculent deposit, which otherwise is apt to adhere, and to be drawn over with the collodion; the mass of pyroxyline wetted by the spirit acts effectually as a *mop*, and cleanses the sides.

In drawing off the collodion, place the bottle in such a position that the end of the siphon comes between the eye and a strong light; any flocculi which appear likely to be drawn into the end of the siphon will then be seen, and may be avoided. When it is not intended to re-fill the bottle immediately, pour out the sediment and introduce half a gallon of absolute alcohol, which will absorb the remaining ether vapour, and prevent it from being oxidised into acetic acid, and afterwards forming acetic ether. On one occasion, a two-gallon bottle—having been used for collodion and left empty—was put away in a dark place for about three months. It was then washed out with about a pint of plain collodion, and re-filled. The result, however, was unsatisfactory; for on adding the iodiser to the newly-made batch, it at once became yellow, which was probably due to portions of collodion left at the bottom of the bottle having decomposed and ozonised the ether. Mere washing with plain collodion was not sufficient in this case, and a thorough cleansing with shot and water should have been resorted to.

No attempt must be made to utilise the sediment of the plain collodion by re-distilling the ether from it. This I have tried, but with indifferent success; for although the ether so recovered appeared tolerably good at first, it soon acquired the property of liberating iodine from iodide of potassium, and the collodion then became unfit for any purpose, excepting copying objects of still life, where extreme sensitiveness is not required.

Whilst the collodion is settling down, the bottle should be covered over, to exclude the light. The room which I used was a vault lighted by gas; and whilst plain collodion remained in that room, it continued good; but, if any portion were taken up into the glass house and left exposed, I always found that it gradually deteriorated, colouring at once on adding the potassium iodiser, and being deficient in sensitiveness.

In manufacturing collodion in large quantities, I think that mistakes will be prevented if separate measures, scales, funnels, &c., are kept for each purpose; and in cases where two operations are being carried on at the same time—such as picking out wet pyroxyline, and filtering iodising solution—a basin of water may be placed near at hand, into which the boy dips his fingers in passing from one process to the other. The mention of matters so trivial may excite a smile; but I think that the importance of extreme method in all matters relating to photography is sometimes overlooked.

(*To be continued.*)

POLARIZED LIGHT.

In the early days of photography, some of our leading journals termed it a *mechanical art*, and treated the subject with great indifference. Gradually, however, those prejudiced opinions were removed by the sheer power of growth which the art itself put forth; and in these days, even the highest men connected with the fine arts give it a wide place in their aids to study. The discoveries which this wonderful agent has brought to our knowledge are already numerous—what *may* spring from it is uncertain, but greater things may yet be naturally expected. Already, a man must be well read in many things to be a really successful photographer; but to unfold any of its hitherto unknown wonders, he must know many more. He must understand the action of *light*, as well as that of his chemical agents; and it is on this account that I thought a familiar sketch of the above subject might lead some to a more intimate knowledge of their great acting power.

What is *polarized light?* is the first question to be answered. A ray of light is not a single plane or stream flowing in one direction only to be used in no other, as has been advanced; it works, at least, in two ways, as one plane crossing the other. The common light, then, is the same viewed from any side, but polarized light is robbed of its action in one direction, and only works in one plane. This explains the term *polarized*, which simply means that the light has acquired the property of *poles*

or *ends*, whereas, before, it could have no such term applied to it, as it worked every way alike.*

Now we may enter into the visible proofs and mode of giving this property to a ray of light. When sunlight falls upon a piece of plate glass at any angle (except the polarizing), part of the light penetrates the glass, and another part is reflected from its surface, and this takes place even a second time, if the reflected light is again allowed to fall upon another plate. But if we use two plates, and place them so that the original light falls upon the first plate at the angle of 56° 45′, and on the second plate the light be reflected at the same angle, we shall find the rays to have undergone some peculiar modification. When the plates are parallel to each other, the light reflected by the first will be also reflected by the second glass; turn the second glass round a quarter of a circle, still keeping the same angle to the horizon, and the light is transmitted and not reflected. So that at one of these angles an object would be visible, at the next almost, or quite, invisible; another angle of 90° would bring it to sight again, another would again darken it; and this simply that each angle of 90° (or a quarter of a circle) would cause the reflected light which reaches the eye to be transmitted, and so be lost; or, the transmitted, instead of reaching the eye, be reflected, and so become useless to the eye, which the transmitted ray alone would benefit.

Thus, the fact that light is "polarized," or modified in its action, is easily proved, but a more interesting course of experiment remains, by which we can go more deeply into this fact and its effects.

Every one who has paid the slightest attention to light as a study, is familiar with the fact, that the seven primary colours, when duly proportioned and mixed, produce a white, or rather that red, yellow, and blue, produce the white; orange, green, indigo, and violet, only being the *overlappings* of these three primary colours. Also, it is a well-proved fact, that each colour proceeds from a different length of *wave* or *ray;* the red has the longest ray, the yellow comes next, the blue is still shorter. This is familiar to every one who has worked in photography with an UNCORRECTED LENS; after focussing by sight, he had to push in the lens about one-twentieth part of its focal distance to get anything like a distinct picture, because the *yellow* ray is the one which acts upon the sight, and the *blue* ray is that which does the "impressing" work upon the photographic medium. Another great fact to be remembered, is the effects of one ray *interfering* with another—the rays of light have been likened to waves upon a sheet of water, so that if one wave of light meets another in the same position, its intensity is doubled, as one wave of water placed upon another would raise it to a double height. If, however, one wave, instead of falling exactly upon another, came by *interference* just into the *hollow* of the other, the undulation would be exactly what was required to produce a *level*, and so both would become neutralized, and no vibration would cause darkness. Another fact which it is necessary to be informed upon, is the DOUBLE REFRACTION of light. If certain crystals (as Iceland spar) are placed upon any object, the eye will see *two* such objects, because the rays proceeding through such crystals are bent, as it were, into two angles, and so convey two images to the eye. If, however, the refracting power is not sufficiently strong to produce separate rays, diverse enough to appear complete in each image, colour may be produced by the interference of the rays.

But here we are led into the phenomenon of colours by polarization, to illustrate which, it is necessary to follow some particular method of accomplishing it. The most commonly used is that by a prism invented by Nicol, of Edinburgh. The microscope affords the most interesting and common method of studying this branch of optics, and it is to this instrument the last-named invention is usually applied. The ends of this prism, placed in a peculiar position, are cut off at a certain angle, of which a long description need not be given; one prism is then placed so that the light may pass through it before reaching the object, and somewhere above the object another is made, so that it may be what is termed the *analyzer*. If, then, the axes of these two prisms are made to coincide, and we then cause one to revolve, the first-mentioned effect takes place; at one point it is dark, because of the light being completely cut off; turn the prism 90°, or a quarter of a circle, and the light reaches the eyes; another quarter, and it is a second time obscured; another quarter, and we have light, and so on. But, suppose we leave it dark, and then place between them a thin plate of selenite, or any doubly refractive medium, we shall immediately see a colour according to the thickness of the substance used. If, as before, the prism be now turned one-quarter of the circle, instead of seeing it simply light or dark, we shall see another colour complementary to the first. For instance, should the interposition of the plate of selenite change darkness to a blue light, turn the prism 90°, and we shall have orange, *i.e.*, the colour required to make white light when mixed with blue; another quarter being turned, blue will again appear, and so on round the circle. By some contrivances, it is not difficult to get the apparatus to show two sets of colours at the same time (the original and its complementary), and to make them *overlap* a little. In that space where one colour lies upon the other, white light is the result, proving that much, if not all, of the theory which we now receive on this subject is a true one.

If, instead of a plate of selenite, the crystals of any of what are termed *polarizing salts* be placed under the influence of this light in the microscope, a splendid series of colours will be seen. Many crystals, however, do not belong to this class, and if any of these (common salt, for instance) be substituted, no colours result. Therefore, amongst those working at this study, the salts are classed as "polarizers" and "non-polarizers."

We must now attempt to follow out the reason why these colours arise, and the laws (if there be any) as to the difference between separate crystals, media, &c. It has been stated that when one ray of light meets another in the same position, its intensity is doubled; but if two meet and come together *by interference*, so as just to fit into each other, as it were, darkness results. But if, instead of *exact coincidence*, or an exact level being gained, the rays meet under other conditions, colour will be the result. In the case, as before chosen for illustration, suppose the ray polarized by the first prism falls upon the second, so as to be unable to penetrate it, and, as before stated, the selenite shows us the coloured light on being placed between the two prisms, the cause becomes apparent, the polarized ray is divided into two, each being at the angle of 45° to the original ray, and consequently at right angles to each other, these then fall upon the analyzing prism, and falling in a different place, as to its axis, to that upon which the polarizing ray originally fell, some of the "light waves" penetrate the prism, and, by *interference*, produce colour. Turning the prism then produces the complementary colours, or the other rays which were wanting to make white light, as red being the original colour, by turning the analyzing prism we get green, and so on.

If the plate of selenite be even, or of uniform thickness, the colour will be uniform, but by using a plate of different thicknesses, we get different colours, the thickest giving red, the intermediate yellow, and the thinnest blue, and the middle shades by other thicknesses.

It is easy by using a doubly refracting prism (Mr. Woodward says) and a plate of selenite of uniform thickness, to see the *complementary* colours at the same time; thus we are afforded a beautiful illustration of the *decomposition* and *recomposition* of white light.

The reason why some objects polarize light and others do not, or in the microscope give these beautiful colours or not, is that it is only a certain number which possess the property of *double refraction*. It was before stated that the crystals of common salt possessed none of this power, and gave no colours; whilst, if we substitute nitrate of potash, a beautiful set of colours arise, or, in other words, that common salt is a "non-polarizer." This simply arises from the fact that the cubic crystals of the salt are not *doubly refracting*, whilst the six-sided prismatic form of the nitrate of potash possesses the latter property in an eminent degree.

Thus we have passed through some few features of this peculiarly modified light. If the reader of this be led on to the desire of a deeper knowledge of the subject, the purpose of this article is completed; and he may gain his end by the study of "Woodward on Polarized Light," a cheap and good explanation, &c., of the subject. O

* Woodward says, "As these opposite properties of the different sides were supposed to bear some analogy to the opposite properties of the different poles of the magnet, a ray of light so modified was said to be *polarized*. It is, however, universally admitted that the term is unfortunate, as it affords no indication of the phenomena it professes to describe." Using, however, the explanation as above, seems to me to explain all we do know about it, and, at the same time, to give, at all events, a slight idea of its properties—that it has fixed poles or ends, and that it is a plane which *only works one way*, as it were.

ON COMPOSITION AND CHIAR-OSCURO.—IX.

BY MR. LAKE PRICE.

"Say, shall we wind
Along the streams? or walk the smiling mead?
Or court the forest glades?"—*Summer.*—Thomson.

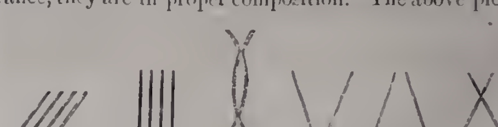
Landscape, although in the main governed by the same rules, differs from figure composition in this respect, that the objects of which it is composed, as trees, rocks, water, and clouds, are more diverse in their character and nature; and light and shade enter more completely into the composition of the picture, than it does even in figure subjects. Thus, if the landscape painter desires to balance *forms* which have too much linear weight, or inclination, at one side of his picture, by *cloud shadow* he can at all times establish a contrasting line. The sky also enters *largely* into landscape composition, and by the judicious arrangement, or otherwise, of its forms, the merit of the whole work may be affected; whilst by the skilful treatment of sky and chiar-oscuro, we see subjects which are in themselves commonplace, invested with an interest, or clothed with a grandeur, they intrinsically do not possess.

Space, light, and atmosphere, are qualities of primary importance in landscape; and, although in art they must be mainly produced by colour and chiar-oscuro, linear composition plays also a large part in taking the mind of the spectator *into* the picture, and away from the flat surface on which it is represented. Foregrounds should always be designed or selected which assist this principle; a line of road, palings, or any similar objects, foreshortening into the first plan of the subject, will establish a depth in the picture, thus starting with a feeling which the spectator unconsciously continues beyond. But should the objects be formal or straight in their lines, as a quay, or line of wall, or pavement, at intervals, by figures, or some other objects, this line should be broken and interrupted to re-appear beyond; or if, by its nature, the subject does not offer facilities for such lines, the eye of the beholder must be taken into the picture by other means. Thus, any objects, as rivers, &c., which make up these lines, *a*,

a

possess the quality of *leading into the picture*, and by this composition the idea of depth is created and sustained. The reader will find this principle in all good landscape composition.

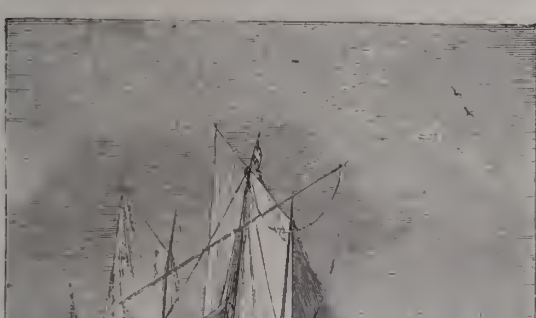
If, in a landscape, the trunks of two or three trees were thus represented, *b*, they would not compose; thus, *c*, they would be tasteless and formal. The artist so arranges their lines that, whilst retaining a perfectly natural appearance, they are in proper composition. The above picture



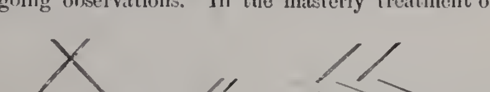
b *c* *d* *e*

by Wilson illustrates the principle; the stems of these trees, whilst full of character and drawing, compose properly, *d*;

and also, by the judicious opposition of their forms, their actual *drawing* is better expressed than it would be if their outlines, instead of contrasting, followed each other. The cloud forms *balance* the lines of the foliage; whilst the dark mass of rock gives, by contrast, light, atmosphere, and distance; and, indeed, the student will find that the smallest study of a group of weeds, &c., is either agreeable or otherwise, as its lines, *e*, are in accordance with the rules of composition. So, in marine pieces, the lines of the masts of shipping, whether represented afloat or lying dry ashore, would not compose if represented as above. In a variety of ways they must be brought into good compo-

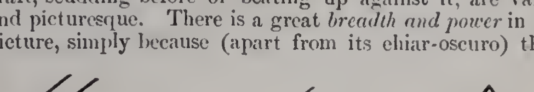


sition. These boats, by W. Vandervelde, show the lines of the sails antagonised by the yard, which crosses the subject in the contrary direction, and gives, *f*, this quality to the lines. In sea pieces, the consecutive line, *g*, is sometimes found accentuating the drawing of vessels depressed by the action of a *strong wind*, of which this repetition at once gives the sentiment; but the painter should then contrive that, in another form, the balance of his work is restored either by the direction of the run of the sea, *h*, a cloud-shadow, *i*, opposing forms in the sky, or otherwise. The cut, heading the previous page, from Turner's "Mouth of the Humber," illustrates the foregoing observations. In the masterly treatment of this



f g h

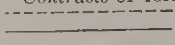
subject we see clouds, sea, and vessels, with their appropriate and characteristic forms; not mere *flat*, paper clouds, but such clouds as Nature herself draws in the camera, with their *rotund* and defined masses piling up one within the other; the sea not rocky and motionless, but driven, lashing and seething, before the squall; whilst the forms of the craft, scudding before or beating up against it, are varied and picturesque. There is a great *breadth and power* in this picture, simply because (apart from its chiar-oscuro) there



i j k

is perfect *unity* in the disposition of its lines. Laying a tracing-paper on the cut, and marking them, their intention becomes apparent; we then see the lines of the leaning masts opposed by the forms in the sky, whose direction is palpably emphasised and continued by the ropes and yards of the nearest, and the bowsprit of the more distant, vessel. Indeed, except the *horizontal* of the distance and *perpendiculars* of the ships' masts, we find *all* the lines in the picture taking distinctly one or other of these directions, *j*, their first impulse in the topmost cloud, *k*, being immediately *antagonised* by the ensuing lines. This is vigorous composition by the hand of a great master.

Contrasts of form composing the landscape are necessary:

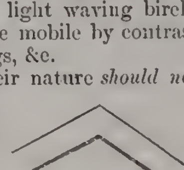


l

thus, in depicting a calm, a view over a plain, or sands, the judicious artist does not follow the straight lines of water or land by other *similar* forms in the sky, *l*, he at once *contrasts* them by bold rolling clouds, whose forms carry up the otherwise too flat composition. This treatment we *always* see in W. Vandervelde, who painted much this class of subject; in Bonington, &c.

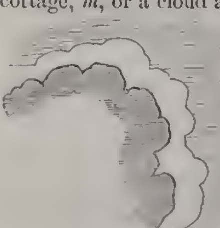
Directly reverse subjects, namely, mountainous scenery, would suffer by such treatment, since the lines of the sky would simulate too much the outlines of the mountains, which, rising high up in the picture, fulfil the same end that the clouds did in the former, whilst the plain or lake at their base replaces the horizontal of the flat subjects. Evidently, mountainous scenery is the class of subject which, from the rigidity of its forms and its high horizon, offers the greatest facilities to photographic representation. *Contrasts* of forms should likewise be seen in the *details* of the landscape: thus the heavy foliage of the oak or chestnut should have their foil in the feathery ash or willow, or light waving birch, and the foliage of all be rendered more mobile by contrast with the rigid masses of rocks, buildings, &c.

The forms of objects different in their nature *should not be repeated*, or reflected by similar ones, in objects of a totally opposite kind. Thus, in painting or selecting landscapes, we should be careful that the outline, say of a distant hill, is not immediately above the gable of a cottage, *m*, or a cloud above another form which simulates it.



m

In the engraved picture of "the Lock," by Constable, we see an example of such a weak disposition of lines; and the forms of the trees are *literally* repeated by the clouds behind them, *n*, which, if "suggestive" of anything, would be of a livery cape—green, turned up with white. The cut is reduced *fac-simile*, and shows the absurd effect of such a want of composition.



n

In "the Herdsman," (see preceding page,) by Claude, we perceive the different manner that great master treats similar masses of foliage. In it we do not see the clouds edging the round masses of the principal group of trees, but lightly flitting in contrasting forms. The breeze seems to rustle the leaves of the *waving* foliage, the forms of which are most judiciously varied, from the mass of the rugged stump on the right to the light feathery trees on the opposite side, the leaning trunk of one of which antagonises the main diagonal of the subject. By the lines of these trees crossing each other, the idea of motion (their waving in the wind) is skilfully furthered; since the eye being impressed with their lines, first in one direction, then in another, a feeling of mobility is given; the *perpendicular* lines of the columns of the temple immediately beyond much assisting the sentiment. The heavy central mass of foliage is relieved by the opening glade seen through it, and balanced by the weight of colour and texture of the gnarled stump, whose rough bark gives delicacy, by opposition, to the soft aerial tints of the distance, and enhances the principal light of the sky.

(*To be continued.*)

Dictionary of Photography.

Milk.—A peculiar liquid, secreted by the mammæ of mammiferous animals. It is white and homogenous, but is, in reality, an emulsion, composed of a transparent serous fluid, with numerous globules of fatty matter floating therein. When allowed to rest, these rise to the surface in the form of cream. When the cream is removed, the residue is termed skim-milk, and, if left to itself, will become acid, when the clots, termed *curds*, separate from it; but if an acid be added, an albuminous substance separates, termed *caseine*, which is the basis of cheese. The residual serous fluid, or *whey*, contains sugar of milk, lactic acid, and other substances. Owing to the presence of a peculiar ferment (the lactic), milk undergoes fermentation, yielding an intoxicating spirit. When fresh, milk has always an alkaline reaction; but it soon becomes acid, from the conversion of its sugar into lactic acid. Lactic acid combines with oxide of silver, and forms lactate of silver—a soluble salt, which possesses photographic properties. Lactate of iron has been employed as a developing agent for collodion negatives. Serum of milk is sometimes employed as a preservative agent for collodion negatives, and in the preparation of positive paper; it dissolves the soluble iodides, and the albuminous substances it contains, together with the sugar of milk, constitute an excellent sizing.

Muriatic Acid.—The old name for hydrochloric acid, and sometimes called "spirits of salt:" it consists of hydrogen and chlorine.

Negatives.—The images obtained in the camera obscura are always what are termed negative, or inverse, that is, the lights and shadows and the position of objects are the reverse of what they appear in nature. This term has been greatly objected to by scientific writers, but it is so thoroughly incorporated into the photographic vocabulary, that it will doubtless remain undisturbed.

Nickel.—A white metal much employed in making alloys of copper, which it renders white also, as seen in German silver. Iodide and bromide of nickel have been employed for iodising collodion, it is said, with very satisfactory results.

Nitrates.—Chemical compounds formed by the combination of nitric acid with various bases. In photography the most important of the nitrates is nitrate of silver.

Nitrate of Ammonia.—A salt produced by the combination of one equivalent of nitric acid with one equivalent of ammonia, and one equivalent of water. It is in the form of prismatic crystals, deliquescent in the atmosphere, which dissolve in rather more than their own weight of water. Nitrate of ammonia is a solvent of oxide of silver; it is produced in the silver baths whenever collodion, containing salts of ammonia, are immersed in them.

Nitrate of Baryta.—A salt composed of one equivalent of nitric acid combined with one equivalent of baryta. It is permanent in the atmosphere, dissolving in twelve times its weight of cold water, and in four parts of boiling water. Its solution is employed as a test to detect the presence of sulphuric acid. In photography, it is employed to obtain proto-nitrate of iron, by the decomposition of proto-sulphate of iron.

(*To be continued.*)

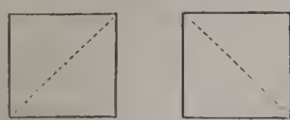
The Amateur Mechanic.

wood—(*continued*).

The Mitre Joint.—This is one of the most neat and simple joints the amateur can make, and is suitable for the corners of almost every kind of framing. It is especially useful for joining the corners of dark slides, corners, picture frames, &c. To make this joint with anything like facility and precision, it is necessary to have a mitre-block by which to cut the right angle. As the amateur may easily make this for himself, and will find it of constant utility, we shall describe it in detail.

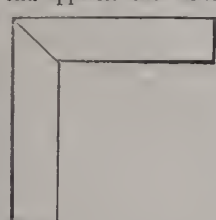
Take a piece of wood—the kind is not important—of almost any convenient length—say, eighteen inches or two feet long, two inches wide, and one inch thick. This should be planed quite square and true; it is then to be glued upon the flat side, close to the edge of another piece of wood the same length and

thickness, but four inches wide. In the first-named, or upper piece, saw-cuts are to be made of the required angle, which serve as guides, at all times afterwards, to cut a mitre with the proper amount of bevel. To get the proper angle for these saw-cuts, the simplest plan is as follows:—Near the centre of the upper piece of wood mark out, by means of the rule, square, and pencil, an exact square of two inches, and then draw a pencil line diagonally across; by its side then mark out, in the same way, another square of two inches, and draw a line diagonally across from the reverse corners to the first. The two squares will stand thus:—

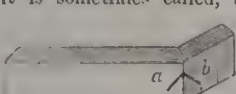


These diagonal lines are to be sawn through the entire thickness of the upper piece of wood, and the *kerfs* or grooves thus formed serve as a guide to the saw in cutting mitres. It will make the block more complete if, in addition to the diagonal grooves just described, an additional one be cut accurately straight across the wood, as a guide in sawing off any piece of wood perfectly true and straight. The mitre-block, when complete, is shown below:—

The piece of wood to be mitred is laid upon the part of the block marked *a*, and pressed firmly against the upper part *b*, which contains the saw-cuts, with the end opposite the first diagonal groove; the saw is then placed in this groove, and the wood cut with the requisite level for forming the mitre. Another piece is then placed with its end opposite the other diagonal groove, and sawn in a similar manner. The two pieces, when brought together, form the mitre joint, thus:—

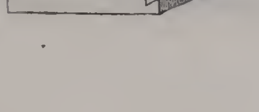


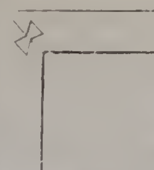
The central groove in the diagram is to guide in cutting a piece of wood perfectly true and straight. The lower member *c* of the diagram, is simply a ledge to hold the block firmly against the edge of the bench or table on which it is placed for use. The mitre joint may be secured either by brads or glue, or both; but, if much strength be required, these will not be sufficient—some additional stay must be added. One of the most common methods of giving strength to mitre, especially where the frame to be joined is light, and the joint is required to be neat as well as strong, is known as *keying together*, or, as it is sometimes called, *tongueing*. The mitre having been formed, a saw-cut, *a b*, in a slanting direction, is made in the corner, as shown in the diagram.



Into this groove is glued a thin slip of wood, called the key or tongue. It is, of course, necessary that this slip be tolerably strong; a piece of rosewood veneer is best, when at hand. If a suitable piece of veneer be not convenient, a piece of the oil-cloth used for covering floors may be used: this is, as will be seen, somewhat wanting in rigidity, but it is tough and strong. If the frame be very thin and light, the groove cannot be cut in a slanting direction, but may be cut straight. In this case the joint is not quite so strong.

Another method, giving additional strength, where the frame is stout enough to admit of it, is somewhat similar to the last, but the key is in the form of a dovetail. The method of effecting this joint is sufficiently shown in the diagram:—





A dovetailed key may sometimes, with advantage, be let into the side of the mitred corner, as here shown:—

Clamping is a process resorted to, either for the purpose of preventing a piece of wood from splitting, or in order to give it additional strength and rigidity. It consists in joining to the edge of one piece of wood another piece running the contrary way of the grain. For instance, the wooden back of a pressure frame should be clamped; the back will consist of a piece of wood, the grain of which runs from side to side of the frame, to each edge of which is joined another piece, the grain of which runs from end to end of the frame. These pieces are the clamps; and, as will at once be seen, they not only give additional rigidity and firmness to the back, but also prevent it from warping or splitting. The clamps are generally joined by means of a tongue and groove; they may, however, be joined by means of the tenon and mortice, or by dowelling.

Scribing is a method of forming joints which will rarely be required by the amateur mechanic. It is used by the carpenter to fit one piece of wood to another where the joint is irregular. Its principal use is in joining mouldings in such a manner as to present the appearance of a mitre, but with this advantage over the common mitre—that, if the stuff should shrink, the joint will not appear open; whilst the mitre, under the same circumstances, presents a gap corresponding with the amount of shrinking. The method of effecting it is, by cutting away one moulding to make it correspond to the contour of that to which it has to be joined. The amateur will find an example in window frames, which are generally scribed together.

We have described, as simply and briefly as possible, the principal methods of joining wood. A few remarks will now be necessary on the methods of securing these joints by glue, nails, and screws.

On the subject of glueing it is unnecessary to add more than we have already said, beyond repeating that, to make a secure joint, the glue should be good, used quite hot, and should not have been so repeatedly heated as to get at all burnt, as, in that case, it loses its tenuity, and is useless. The portion which oozes from a joint when pressed close, should be suffered to remain a few minutes to chill slightly, and must then be scraped away with a chisel, or removed with a sponge dipped in hot water, and squeezed nearly dry.

Nails.—The nails of most common utility in joiners' work are *brads*, which are made of various sizes, from half an inch upwards. The fine-cut brads will generally be most useful to the amateur mechanic. In using the bradawl to pierce a hole to receive the brad, take care that the chisel-shaped point of the bradawl be inserted so as to cut the fibre of the wood, by placing the edge so as to cross the grain; by this means, the danger of splitting the wood will be prevented. The brad, it will be noted, is thinner in the shank one way than the other; it should be inserted so that the thinnest part of the shank runs with the grain, causing the least separation of the fibres of the wood; this will prevent the brad from splitting the wood on being driven home. In driving the nail, the hammer should be held firmly, and used with a free swing of the arm; the blows on the nail should be gentle at first, until it is nearly driven home, when more force may be used with advantage. Brads are sometimes driven right into the wood, burying the head, and afterwards covering it with a little putty: in this case a steel punch is used, the end of which is placed on the head of the brad; a blow of the hammer on the punch then buries the brad sufficiently in the wood.

In some cases, where the nail is long enough to come through the two pieces of wood to be joined, *clinching* is an advantage: this can only be effected where wrought-iron nails are used. When the point of the nail comes through, another hammer, or piece of iron of any kind, must be held firmly against it whilst the nail is driven; the effect of this will be to turn up the point, which will re-enter the wood, and bind the joint firmly.

In using screw nails, the hole should be pierced with a gimlet a little less in diameter, so as to make a hole a little smaller than the screw. If the screw be greased before insertion, it will work more easily, and will not be so likely to rust in the wood, and thus be difficult to remove subsequently. Neither nails nor screws have much hold in the end of most kinds of wood.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 9*th April*, 1860.

The photographer's art, we may fairly say, almost entirely reposes upon nitrate of silver. I am perfectly aware that photographs may be obtained with a variety of other substances; but, up to the present day, no professional photographer could prosper without the use of the salt just named. Large quantities of it are, consequently, employed; and it is astonishing to observe how, with us in France, the manufacture of this important salt has improved since photography has assumed the position it now holds. Not only however, has the manufacture of nitrate of silver improved; various means of sophistication have been imagined, various salts have been introduced into the pure article, and a fraudulent mixture has been frequently sold to the unwary photographer, or to the unchemical medical practitioner. The nitrate of silver used in medicine as caustic often contains copper accidentally, and is sometimes sophisticated with *nitrate of lead*, as M. Millet has lately shown in the *Journal de Pharmacie*. The addition of nitrate of lead has, indeed, been practised for many years past. But recently it was found more advantageous to introduce *nitrate of potash* into the silver salt; and, doubtless, other fraudulent mixtures, still more advantageous, will be sooner or later put into practice.

Once for all, then, I will give you an easy method for detecting the adulteration of nitrate of silver, *whatever be the substance fraudulently mixed with it*:—Take some of the nitrate, dissolve it in distilled water, and add an excess of hydrochloric acid. The liquid should be heated to make the precipitate of chloride of silver cohere well together. Then, filter off the supernatant liquid, and, taking a few drops of it upon a slip of platinum, or a watch-glass, evaporate to dryness. If the nitrate of silver be pure, *no residue will remain* after this evaporation. If a residue appear, nitrate of lead or nitrate of potash may be looked for; and, even were these found to be absent, some other substance must have been added to the nitrate of silver to produce a residue in the above circumstances.

M. Davanne writes as follows upon some recent observations of Mr. Hardwich:—"Mr. Hardwich asserts that, among the causes which may modify the constitution of gun-cotton, we should rank light, even diffused daylight. He brings forward the following fact:—Some gun-cotton inclosed in a glass flask, and left upon a table in a light place, appeared to become liquid, and to transform itself into a gummy substance; the flask was emptied and cleansed, and the pyroxyline replaced by another sample from a different source. This second sample was not long in showing signs of a like decomposition. Without wishing to deny in an absolute manner," continues M. Davanne, "the part which light may have played in these decompositions, we think we can bring forward some opposite facts. We have, in our *atelier*, placed upon a table, before a window, a number of specimens of gun-cotton, the results of different processes of fabrication. Some have been in this position at least two years, and all underwent, last summer, a temperature of from 35° to 40° C.; but, up to the present time, no decomposition has been observed."

In face of these apparently opposite facts, I am led to believe that the gun-cotton employed in Mr. Hardwich's experiments contained free sulphuric acid. This would explain the phenomena he has remarked.

A letter, written from South America by M. Liais, formerly of Paris, now Director of the Astronomical Observatory of Pernambuco, has been forwarded to *Le Cosmos*. It is dated "Olinda, 28th February, 1860," and treats of the discovery of a new comet. The author states that, whilst engaged on Sunday evening, the 26th, in taking a review of the southern heavens, he perceived near the star *Mu*, of the constellation Dorade, a telescopic nebulosity which he had not before observed. In about an hour's time he found the nebulosity had moved a little, and immediately concluded that it was a comet. The new-comer is formed of two distinct nebulous masses, one of which presents a brilliant nucleus, the other none. It is, therefore, a double comet. On the 27th, it had travelled a great distance, and presented a slight change; one of the nebulous masses had become more elongated. Drawings were then made of this comet. Its course is towards the south-west. It is only to be seen with telescopes having at least three inches aperture, and M. Liais thinks that he shall not be able to follow it during the full moon, as its light is very faint. This comet, says the author, is the first new star that has been discovered in the Brazils.

At the time the above letter was written, the three observations necessary to determine the orbit of the comet had not been made; consequently, we cannot yet assert that it is really a new one. It is a curious fact, that whilst Donati's brilliant comet, disappearing from our globe, was last seen by M. Liais, in South America (Capt. M'Clintock saw it, whilst in the Arctic regions), this new comet should first appear in the same latitudes.

M. Elie de Beaumont has just communicated to the Paris Academy of Sciences a paper by Dr. Phipson, in which the author shows that the metal manganese, by uniting with oxygen, forms only one acid—manganic acid—analogous to chromic acid; and that the so-called "permanganic acid" does not exist. The salt so extensively used now in chemical laboratories, and known as "permanganate of potash," is shown by M. Phipson to be *bi-manganate of potash*, corresponding to bi-chromate, or anhydrous bisulphate of potash. All these salts have the same chemical constitution, and the same crystalline forms. This may be looked upon as one of the most important discoveries that has been made for some time past in mineral chemistry.

M. Le Roux has observed that when a platinum wire is heated to redness by an electric current from some 12 or 15 Bunsen's elements, a peculiar smell arises from the wire: this was soon found to be owing to ozone, which is formed in the air around the platinum wire.

M. Boutigny d'Evreux, the gentleman who divided with his hand a current of melted iron, at the meeting of the British Association, at Ipswich, and whose work upon "the Spheroidal state of Bodies" has gained for him a well-deserved reputation, has just sent to the Academy of Sciences a few words of objection to the limited manner in which this spheroidal state is viewed in many of our works on Physics. M. Boutigny objects to the term *spheroidal state of liquids* taken exclusively, as *solids* are likewise susceptible of taking it. Some solids, such as chloride of ammonium, bichloride of mercury, nitrate of ammonia, camphor, iodine, stearic acid, margaric acid, wax, suet, &c., pass directly to a spheroidal state without first becoming liquid. If a piece of ice be made to take the spheroidal state, and then thrown upon the back of the hand (in this experiment the product is part in the spheroidal state and part solid), one feels, at a very short interval, two very distinct sensations: first, that of a temperature of $+ 208°$ (nearly boiling water), next that of cold $= 32°$. On operating upon larger quantities, and with the aid of a thermometer, these temperatures are easily determined.

I have many other interesting and novel facts to relate to you, but am forced to postpone them till next week.

The Photographic Tourist.

A PHOTOGRAPHIC TRIP UP THE VALE OF NEATH.

BY J. H. JONES.

Mr. Cliffe, in his book on South Wales, speaking of the scenery of Glamorganshire, says, that it is "full of pictures from end to end;" and this is literally true; for the tourist with his portfolio, or more especially the photographer

with his camera, may travel from one end of the county to the other, and find, I may say at every step, some pleasing landscape, rock, waterfall, or old ruin, the memory of which he would consider well worth preserving by means of our faithful and beautiful art. This is corroborated by the celebrated topographer, Malkin, who calls the county of Glamorganshire the "garden of Wales"—a title with which every person who has visited it fully agrees.

Having provided myself with a stock of prepared plates and other necessaries for taking stereoscopic views, I started from Swansea by an early train, and in a short time arrived at Neath (the Nidum of Antonius), which is a thriving seaport on the left bank of the river from which it derives its name.

Its situation at the entrance of one of the most lovely valleys in the principality, is pleasing; "picturesque" ideas are, however, banished by clouds of smoke from large copper and iron works. The town is irregularly built, but has been much improved lately.

The castle is the first object worth visiting; but the tourist will have much trouble before he finds the object of his search, if he has to look for it as I did, it being entirely surrounded by cottages, the glimpses I occasionally had of it above the roofs of the houses making me still more anxious to find some spot where I could have a closer view of it. At length, to my infinite joy, I found a low modern archway, nearly opposite the gasworks, through which I entered a series of unfenced cottage gardens, and found as good a view of it as could possibly be got. This castle, which belonged to Justyn ap Gwrgan, was enlarged by Richard de Grenville, a near relation of Fitzhamon's, and an ancestor of some of our great English families; he surrendered his Welsh estates to the monastery he here founded. In 1231, Llewellyn ap Jorworth burnt the castle, and all that now remains of it is the entrance, or principal gate, and side towers. The gateway has been blocked up, but it forms a very nice picture, being partly covered with ivy. The church, which is supposed to have been in part the garrison chapel of the castle, is hardly worth visiting, and decidedly not worth a picture. "Towards the north, looking from Neath, the broad top of March Howell towers above all the surrounding hills; and southward the view is bounded by two lofty eminences, called the Foel, and Mynydd-Gaer; the former distinguished by the smoky chimney of the copper works in Cwm-avon, and the latter crowned with an ancient encampment, from whence it derives its name. Neath is nearly the centre of the great coal basin of South Wales, and veins of this valuable mineral may be seen cropping out on the hill sides in the neighbourhood. Much of the coal is anthracite; ironstone is also found in considerable quantities, and the hard sandstone of the coal formation affords a cheap and durable building material. The hills are penetrated with coal levels; and the atmosphere, even of secluded and romantic glens, is often darkened with the smoke of various manufactories, which always flourish most where coal is plentiful." It is, therefore, next to impossible to obtain a picture, when, to use a local phrase, "the smoke is down." Leaving Neath behind me, and following the course of the canal for about a mile towards Swansea, I reached that which is to the photographer a perfect gem—namely, Neath Abbey. The feelings of the spectator at first sight of this truly venerable, gigantic, and solemn pile, are beyond description. He sees before him the work of a past age, truly grand and noble, and which the lapse of upwards of seven centuries has failed to utterly destroy, for many parts still remain to this day nearly perfect. But little did Richard and Constance de Grenville, the first benefactors of the abbey of Neath, when in the year 1129 they witnessed the solemn dedication of the sacred structure to the Holy Trinity—little did the community of Grey Friars, from Savigny, near Lyons, who had taken up their abode in this fair spot, at the earnest wish of the Norman lord and lady, imagine that it would be desecrated by the worship of Mammon, become a smoky ruin, scarcely distinguishable by the passing traveller from the forges, the furnaces, the chimneys, or the squalid outworks of manufacturing establishments, by which it is surrounded. The anthem of praise and thanksgiving has been superseded by the clank of the steam-engine and the roar of furnaces; strange mutation! Yet the old abbey is still pleasant to look upon. It is a memento amid the turmoil of life. It speaks eloquently of a future state, and it is full of interest to the lover of antiquity. The architect of the abbey was named Lalys, one of the most eminent of his time, who also built Margam Abbey, and other structures, ecclesiastical and military, in South Wales. The structure must have undergone extensive alterations and additions subsequent to its foundation. Leland speaks thus of it in Henry VIII.'s days:—"Neth, an abbey of White Monks, a mile above Neth town, standing also in the ripe (bank) of Neath; it seemed to me the fairest abbey in all Wales." In his *Collectanea*, however, this accurate old topographer expresses a preference in favour of Margam. The abbey possessed the privilege of sanctuary; hence Edward II.'s preference. The celebrated Welsh bard, Lewis Morganwg, who flourished about the year 1520, composed a very elaborate ode in praise of Lleison, who was abbot of this place in his time. The subjoined extracts from a recent Welsh translation, and taken from an unpublished vol. by G. G. Francis, F.S.A., &c., of Swansea, bearing the title of "Original Charters of Neath and its Abbey," &c., give a most vivid picture of the abbey. "Like the sky of the vale of Ebron is the covering of this monastery; weighty is the lead that roofs this abode—the dark blue canopy of the dwellings of the godly. Every colour is seen in the crystal windows; every fair and high-wrought form beams forth through them like the rays of the sun—portals of radiant guardians!" "Pure and empyreal, here is every dignified language, and every well-skilled preceptor; here are seen the graceful robes of prelates; here may be found gold and jewels, the tribute of the wealthy. Here also is the gold-adorned choir, the nave, the gilded tabernacle work, the pinnacles, worthy of the Three Fountains. Distinctly may be seen on the glass, imperial arms; a ceiling resplendent with kingly bearings; and on the surrounding border the shields of princes, the arms of Neath, of a hundred ages; there is the white freestone, and the arms of the best men under the crown of Harry, and the church walls of grey marble. The vast and lofty roof is like the sparkling heavens on high; above are seen archangels' forms. The floor beneath is for the people of earth—all the tribe of Babel; for them it is wrought of variegated stone. The bells, the benedictions, and the peaceful songs of praise, proclaim the frequent thanksgiving of the white monks. At the time of the dissolution, there were only eight monks here, and the revenues were, according to Dugdale, £132 7s. 7d. The abbey and its demesnes were granted to Sir Richard Williams, in the 35 Henry VIII., and in 1650 the abbey house formed an admired seat of the Hobby family."

(*To be continued.*)

Photographic Notes and Queries.

PHOTOGRAPHIC OPTICS.

Sir,—It will be no news to you to tell you that most of the original treatises on optics extant were written before the advent of the art of photography; so that when the photographer consults them on any difficult or doubtful point, he does not often obtain what he wants. Not one word does he find about "orthoscopic," "stereoscopic," "orthographic," or "caloscopic." It is true, we do meet with "periscopic" and "aplanatic," but only with reference to telescopic and microscopic combinations. You might have naturally expected that the new edition of Brewster's "Optics" would have had something to say about combination of lenses for photographic purposes, but you may search in vain.

Now, sir, among the many varieties of lenses, at present offered to the photographer, under various euphonic names, by ingenious opticians, the tyro is greatly puzzled which to choose. He naturally desires to get the best he can for his money, and even after taking

counsel of the experienced, and using every precaution, he runs great risk of being dissatisfied with his bargain. What he desires is, that kind of knowledge which will enable him to judge for himself. I would, therefore, suggest that you supply this information through the columns of your useful journal. What he chiefly requires to know is, the capacity and power of single and compound lenses, the combinations necessary to obtain given results, the effects of changing the position of lenses in combinations, and the differences produced by turning one side of a lens now inwards, now outwards; the influence of diaphragms in front or between lenses; the principles of construction of the various combinations now in vogue, showing in what one differs from another, and why. All this, sir, and much more that will suggest itself to you, will be most acceptable to every young photographer who desires to know "the why and the wherefore" of his proceedings. At present, we are literally working in the dark, under the shadow of empiricism, and I ask, with the dying philosopher and poet, for "more light, more light."

A Photographer out of Focus.

CLEANING PLATES.

Sir,—Does the cleaning of dirty plates with soda have any injurious effect?

I think not; for the last two years I have put dirty plates into a strong solution of soda, in which they remained for about a month; then taken out, rinsed in water, and dried with a clean cloth. Previous to using the plate, I rub on the side intended to receive the sensitive film, a few drops of the following solution:—

Water	1 pint.
Spirits of wine	2 ounces.
Common salt	1 ounce.
Tripoli	4 ounces.

This I keep in a bottle, with a hole through the cork, so that a few drops only can pass out at a time; first shaking the bottle. I rub it on the plate with my fingers, or the palm of my hand, taking care to rub well into the corners of the plate, then wipe with a cloth kept for the purpose, and polish with a second cloth.

There is a cloth, I think, known by the name of *swan'sdown twill*, which does admirably for polishing, as it is soft and woolly on one side.

If the above plan be carried out, we shall not hear so much of dirty plates; *an annoyance I never suffer from.*

Thomas Clarke.

2, *Ordnance Terrace, Shooter's Hill.*

MAGIC LANTERN CAMERA.

Sir,—Will you permit me to say a word about the camera as a magic lantern?

I think, from my own experience, it is never likely to answer the end so anxiously desired. There is great truth in the statement made in former numbers, that one cannot make it to answer all purposes. The fact is, I have been trying every way to adapt it to the object referred to, but without success. It is true, I can get an enlarged image of the object on a screen, just the same as if I were taking an enlarged portrait from a negative on sensitised paper, which may probably be about a foot square or so, and, perhaps, might do for a mere house exhibition, to gratify a family; but to expect it to cover a screen some 9 or 10 feet square, adapted to an exhibition in a school, is far beyond the limits of its adaptation. Pray, can any of your correspondents do better? If so, will they generously show the method they take to accomplish their object? I always await with eagerness the arrival of your weekly serial, and am generally pleased with its varied contents; and as you and others so kindly solve doubts and unravel knotty questions, may I hope for a notice of this one? Apocryphal.

FORMULA FOR COLLODION.

Sir,—I thought it unnecessary to detail more in my formula for collodion; but, in compliance with "T. W. F.'s" wish, I give him my plan of mixing it.

Pour the alcohol into the ether, shake, and add gun paper (the paper quickly dissolves). Put alcohol and iodides into another bottle, and, when the paper and iodides are dissolved (the cadmium salt dissolves almost immediately, but the iodide of potassium, if the alcohol be pure, will be some time first—thus I tell the strength of the alcohol), mix the two solutions, shake well, and allow it to stand 24 hours.

In answer to the second query, I must refer "T. W. F." to No. 67, p. 180, of the "News," where he will find my first reply to "H. R. R.," in which I inclosed a print, of which, as "T. W. F." will see, the Editor spoke very highly. This print is the copy of an engraving. In fact, I have found the collodion answer all purposes, and that well. Oxoniensis.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Monday,	April 16	—Blackheath Photographic Society.
Thursday,	„ 19	—South London Photographic Society.
Tuesday,	„ 24	—Birmingham Photographic Society.
Wednesday,	„ 25	—North London Photographic Society.
Friday,	„ 27	—Photographic Society of Ireland.

TO CORRESPONDENTS.

Erratum.—In our impression of last week, p. 367, for "Conde Dague," read "Conde Duque."

Photographic Society of London.—The communication read by the Secretary (see "Photographic News," April 5, p. 375), relating to the successful exposure of a dry collodion plate, sensitised last August, was received from Messrs. A. Marion and Co., in one of whose preservative cases the plate had been kept.

J. W. R.—Lawson Sisson's turpentine-waxed paper process gives perfect results. Serum of milk is prepared by boiling a quart of skimmed milk in an enamelled saucepan, and adding acetic acid, drop by drop, to coagulation; that is to say, until it turns, and separates into lumps. It is then filtered through fine muslin, and the white of an egg beat up in the clear liquor when it has cooled down to about 104° F. It is then boiled again; the albumen, coagulating, clarifies it. It is then filtered a second time.

Puzzled.—Add two or three drops of nitric acid to the bath: have you added iodide of silver to it? if not, do so. If you have put nothing into the solution besides what you state, we see no reason for it not working well. If you read the last three lines of the answer to "Avon," you will gain the information you seek. A saturated solution of sulphate of iron is water containing as much sulphate as it will dissolve, which is readily shown by some crystals remaining undissolved at the bottom of the bottle, after repeated shaking, during ten or twelve hours.

W. H. Walter.—1. It is not the fault of the collodion, but of the manipulation; probably in draining the plate after it is removed from the silver bath. 2. If the varnish *runs up* the plate, it is probably because you have made both plate and varnish too hot; the heat should be moderate, and gradually applied. The collodion you name is successful in the hands of many operators.

Paper.—It is not possible for us to say what thickens your silver solution, but it seems to be iodide of silver. Dilute it until a deposit ceases to fall; then filter, evaporate, and crystallise, again and again, until the crystals are perfectly white.

Merlin.—You will do well to study simplicity in your formulæ: you have encumbered yourself with complexities unnecessarily, and, consequently, become involved in difficulties from which we see no escape but in beginning *de novo.*

Orton.—When you make another silver bath, use nothing but pure crystals of nitrate, and a few grains of iodide of potassium; then test for alkalinity, and, if necessary, add the minutest possible dose of nitric acid.

Anxious.—Try the effect without the nitric acid. We do not see why your present practice should prove detrimental. The colours are usually made to adhere by coating the film with a weak spirit-varnish.

A Sheffielder.—The colours are applied by gently tapping the brush charged with colour over the spot to be coloured; the colour falls on and adheres. If you apply the brush, you cannot get a smooth, even surface.

Emma F.—1. The lenses you name are as good as any. 2. If you order a twin lens stereoscopic camera, you will obtain what you require; there is very little choice of makers.

Walter Ager.—The best positive developer is—Water, 12 ounces; alcohol, 5 drachms; acetic acid, 5 drachms; sulphate of iron-crystals, 4 drachms; sulphuric acid, ½ drachm (by measure). Procure "positive" collodion.

Z.—Temperature often interferes with the toning. Place the bath in a vessel of warm water; watch the proofs carefully, and take them out when they are "done to a turn."

Photo (Chichester).—What you describe must be an amalgam of mercury, tin, and zinc; mercury, 6 parts, previously heated in a crucible, and a melted alloy of zinc, 2 parts, tin, 1 part, added to it.

H. Wilson.—It requires a very skilful artisan to make a photographic camera. You had better obtain a catalogue from one of the makers who advertise in our columns, and select from it what you require.

V. L.—The same as above, in reply to "Z." It is best to use no more than is required each time. "Strengthening" often produces failures.

Ch(«Chuck»).—

Chuck.—China clay is free from iron, and there will be no need of washing it with the acid. Marine salt is Na Cl.

An Amateur in a Fix.—There is no discrepancy between the prices charged for ¼ and ½ plate. Your £10 10s. will be well laid out.

R. Gordon.—It is not the fault of the cadmium. Perhaps the collodion is decomposing.

W. Hazell.—We gave all the information we possess in our last number. More anon.

W. D.—If immersion in distilled water does not answer the desired end, try a weak bath of nitrate of silver for five to ten minutes.

Amicus.—See "Encyclopædia Britannica," Ure's "Dictionary of Arts," or any similar works.

Despairing.—Your collodion has lost much of its ether. Add a fresh quantity, in small doses at a time.

Photos.—The actinic rays are approaching their maximum at present. You must make due allowance for the presence of moisture in the air.

Wenham.—We suspect your silver bath has become too weak. Make a fresh one.

Arden.—Your letter has not been received.

Delta.—We prefer citric to acetic acid in negative developing solution.

H. H. H.—The metal is oxidised by the action of the acid.

W. T. W. (Chatham).—Does not your camera admit light?

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 85.—*April* 20, 1860.

ON COMPOSITION AND CHIAR-OSCURO.—X.

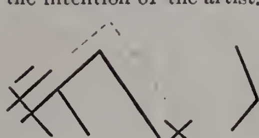
BY MR. LAKE PRICE.

"That is the very thing I complain of," answered Tinto; "you have accustomed yourself so much to those creeping twilight details of yours, that you are become incapable of receiving that instant and vivid flash of conviction, which darts on the mind from seeing the happy and expressive combinations of a single scene."—*Bride of Lammermoor.*

Thus happily does Scott, with the force and truth of perception belonging to kindred genius, express one of the soundest principles which governs artistic composition; and we may feel convinced that all pictorial representations should be so designed that by the *unity* and *simplicity* of wavering of purpose in the designer, *d*. True art in painting does *not* consist, as some critics would persuade a confiding public, in the working or touching-up of some infinitesimal portion of a subject to microscopic minuteness. In photography, *broad and striking effects of chiar-oscuro on well-selected lines* will annihilate the "sharp" pictures which have but that quality on which to base their claims to admiration; *mind* and sentiment should spread over the *whole* imagining and direction of a composition; mere mechanical elaboration is not the object to which the efforts of the producer should be directed in either case.

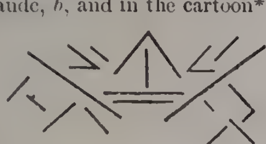
their lines, and perfect *breadth* of their chiar-oscuro, the spectator may *at once* appreciate the intention of the artist.

a



b

By unity and simplicity is meant that quality of *homogeneous direction* which is equally seen in the foregoing Turner, *a*, and Claude, *b*, and in the cartoon* of Raffaelle, *c*, &c. &c., which



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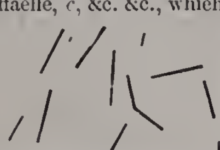
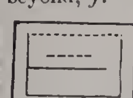


d

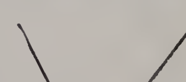
quality would suffer *instant* deterioration by any uncertain

* "The Death of Ananias."

All pictures should appear to the spectator as the subject itself, in nature, would appear, if the portion represented were dioramically offered to his view, rather than as *flat* surfaces inclosed by lines. Landscapes *especially* should, by their lines, suggest that they are merely choice portions of larger expanses. Were the artist to arrange the forms of his subject parallel to the square of the picture, it would be destructive of this sentiment. In the Turner, *e*, the near wave seems but a part of others which are rolling in (unseen) beyond, *f*. Without proper direction of lines, colour and



e



g

chiar-oscuro could not effect the purpose. So the same line reversed gives a similar quality to the foreground bank in the Claude. The side trees in the Claude, *g*, and cloud lines in the Turner, *h*, continue and carry out the principle. In figure composition, the girl turning off on the left, and waving to some person out of the picture, in the

"Moissoneurs," fulfils the same end, and is most judicious, not forgetting that in subjects of *deep and absorbing pathos* this trick of art, as before mentioned, should not occur.

h i j

The repetition at *distinct intervals of distance* in the picture of *similar forms* of *familiar* objects will often much assist the effect of space. Thus, according to subject—human figures, i, animals, tents, *j*, vessels, windmills, &c.—the evident *decrease* of the *same* forms greatly assisting the sentiment of distance.

A good example of what effect of light may do for a landscape is seen in the Ruysdael engraved on the preceding page. The subject offered little to induce the representation of it by the painter; but, by means of his treatment, the flat lines of its horizon are carried up, and rendered artistic, *k*. Ruysdael is a master who has painted many subjects, which possess good *photographic* qualities, namely, glades in woods, &c. Therefore, to study his pictures or engravings from them will be advantageous to the student. Wynants also painted landscapes, which would mainly be judicious to undertake with the camera, such as rough broken ground, with picturesque stumps of trees, &c. And our exhibitions always contain works in landscape, which are of great excellence, the careful appreciation of which will contribute to form the taste and judgment in selection of the landscape photographer.

k

(*To be continued.*)

ON THE CAUSES OF FADING IN POSITIVE PROOFS.

(A.) If a proof is taken from the printing frame, and immersed without washing in a fresh solution of hyposulphite of soda, four different substances encounter each other, which are decomposed into definite products. These substances are nitrate of silver, white unchanged chloride of silver, the sub-chloride of silver of which it is supposed the image consists, and lastly, hyposulphite of soda. The immediate result of these bodies coming into contact, is the transformation of the nitrate and chloride of silver into hyposulphite of silver, nitrate of soda, and chloride of sodium. If the solution of hypo. is concentrated, it immediately dissolves the hyposulphite of silver; the bath, therefore, contains:—

1. Hyposulphite of soda.
2. The double hyposulphite of silver and soda.
3. Nitrate of soda.
4. Chloride of sodium.

As for the sub-chloride of silver, although insoluble in hypo., it is none the less altered; its chlorine is eliminated, and the image is formed of metallic silver, or rather, the chlorine is replaced by the sulphur of the hyposulphite, and the image is formed of hyposulphite. Rarely is the proof formed of pure metallic silver; more frequently it retains greater or lesser quantities of sulphide of silver. But the shorter the time the proof remains in the fresh hypo. the less sulphide of silver there will be.

The formation of metallic silver in the proof is quite natural, as it arises from the decomposition of the sub-chloride of silver in the presence of hyposulphite of soda; for if we consider that the proof loses in the bath all its white chloride of silver, we shall see also that the formula Ag_2Cl, which represents the sub-chloride of silver, gives rise to a simple reaction:—

$$\underbrace{NaO, S_2O_2}_{\text{Hyposulphite of soda.}} + \underbrace{Ag_2Cl}_{\text{Sub-chloride of silver.}} = \underbrace{NaCl}_{\text{Chloride of sodium.}} + \underbrace{AgO, S_2O_2}_{\text{Hyposulphite of silver.}} + \underbrace{Ag.}_{\text{Silver.}}$$

Thus, the opinion generally entertained, that the sub-chloride is insoluble in hyposulphite is not strictly correct. What has given rise to this error is, that the sub-chloride of silver placed in contact with hypo. leaves a residue; but if it had been examined, it would have easily been seen that it was metallic silver.

A proof, washed or not, gives rise to the following reaction:—

1. The unchanged chloride of silver is changed into hyposulphite of silver.
2. The sub-chloride undergoes the same change, but leaves a residue of metallic silver, which forms the image.

(B.) A washed proof, formed of pure silver, undergoes the following changes in a fresh solution of hyposulphite of soda.

If we watch the toning of the proof, we may observe two phenomena, which it is important to explain clearly:—

1. The colour of the proof will become black.
2. A yellow precipitate of sulphur enveloping the blacks of the proof.

We will endeavour to explain this reaction:—

The pure silver which forms the proof cannot be considered as a film of that metal, for it forms a spongy coating over the whole surface of the paper; and it is evident that the silver in such a state of division will have a much stronger affinity for sulphur than when in any other state; now, spongy metallic silver, such as is found in the positive proof, has so great an affinity for sulphur as to remove it from stable sulphur compounds, such as hyposulphite, sulphite, and tetrathionate of soda, so that these bodies are decomposed. The following is the reaction that takes place with the hyposulphite of soda:—

$$\underbrace{2\,(NaO, S_2O_2)}_{\text{Hyposulphite of soda.}} + \underbrace{Ag}_{\text{Silver.}} = \underbrace{AgS}_{\text{Sulphide of silver.}} + \underbrace{S}_{\text{Sulphur.}} + \underbrace{2\,(NaO, SO_2)}_{\text{Sulphite of soda.}}$$

These are two very decided reactions, and it is important to notice:—

1. That if we leave for a *short time* a positive proof in hyposulphite of soda, the image will be formed of metallic silver of a yellow hue.
2. If, on the contrary, the proof remains *several hours* in the hyposulphite, the image will be formed of sulphide of silver and sulphur.

The consequences of these reactions will be shown hereafter.

(*To be continued.*)

PHOTOGRAPHY AND ITS APPLICATIONS.*

CONDITIONS TO BE SATISFIED WHEN THE PLAN AND CAMERA ARE ADJUSTED.

The theoretical conditions that must be satisfied to reduce correctly to a given scale, are:—That the centre of the sensitive plate and the centre of the plan be in the optical axis of the lens. The surface of the sensitive plate should be parallel to the surface of the plan and in the plane of the image, and the marginal lines of the image of the plan must coincide with the rectangle ruled on the ground glass, representing the rectangle the plan should occupy when reduced to the given scale. Figs. 4 and 5 give a general plan and sectional elevation, showing the arrangements made to enable these conditions to be satisfied. The necessary adjustments are made partly with the camera and its stand, and partly with the stand on which the plan is fixed. The plan to be reduced is fastened to the board by the catches, and the arm of the stand is turned till it is as nearly horizontal as can be ascertained. The photographer, looking on the ground-glass plate, draws the camera stand backward or forward, till the image of the plan appears nearly to fit the rectangle ruled on the glass, at the same time bringing the

* Continued from vol. iii. p. 380.

glass into the plane of the image as it advances to or recedes from the lens.

The centre of the image of the plan (previously marked on plan) is now made to coincide with the centre of the rectangle ruled on the glass, by moving the plan in a vertical direction by means of the screw of the plan-stand, and by moving the camera in a horizontal direction on the runners. The parallelism of the surface of the plan and the ground glass will be indicated by the symmetrical position of the margin lines of the image, and the sides of the rectangle on the glass, or, in other words, when the centres coincide, if the surfaces are parallel, the margin of the image will either coincide with the margin of the rectangle on the ground glass, or it will be equally distant from it on every side, and conversely, if the surfaces are *not* parallel.

The rails having been placed carefully at right angles to the surface of the plan, and levelled, and the plan and stand being as nearly as possible vertical, the degree of inclination of the surfaces to each other will be very slight, and such as can easily be adjusted by the motions provided for in the camera stand.

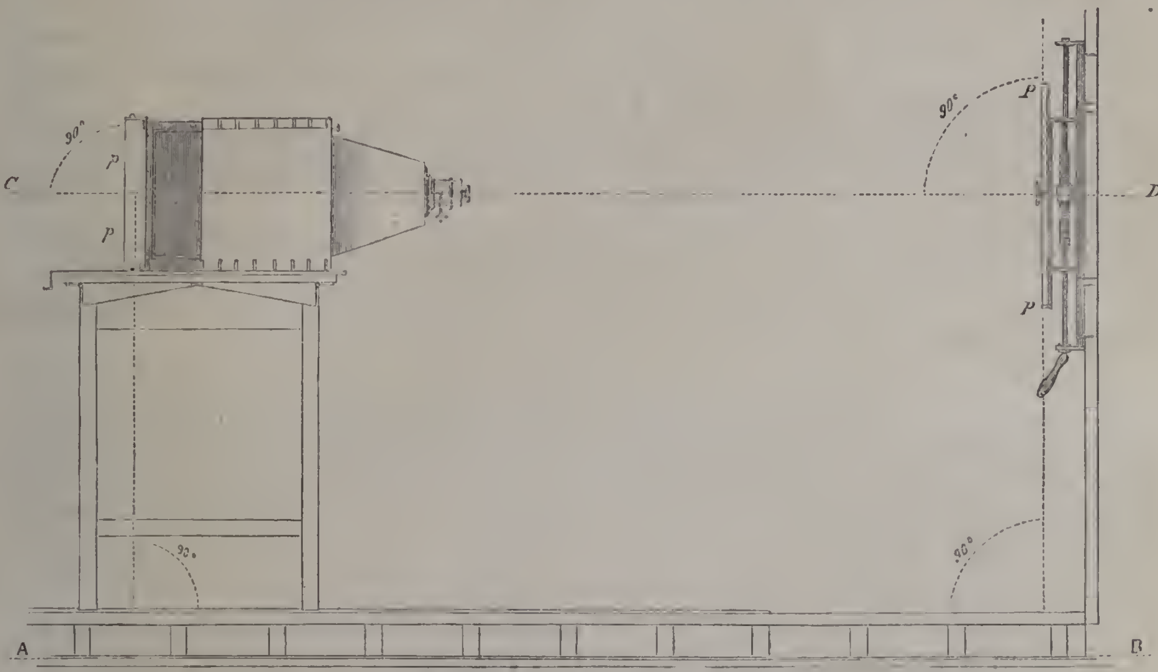


Fig. 4. Section and elevation on A B.

C D. Line in plane of adjustment, passing through centre pin of plan-stand, centre of sensitive plate in camera, and coinciding with optical axis of lens.
P P. Position of plan on board. *p p*. Position of sensitive plate in camera.

SCALE, HALF-INCH TO A FOOT.

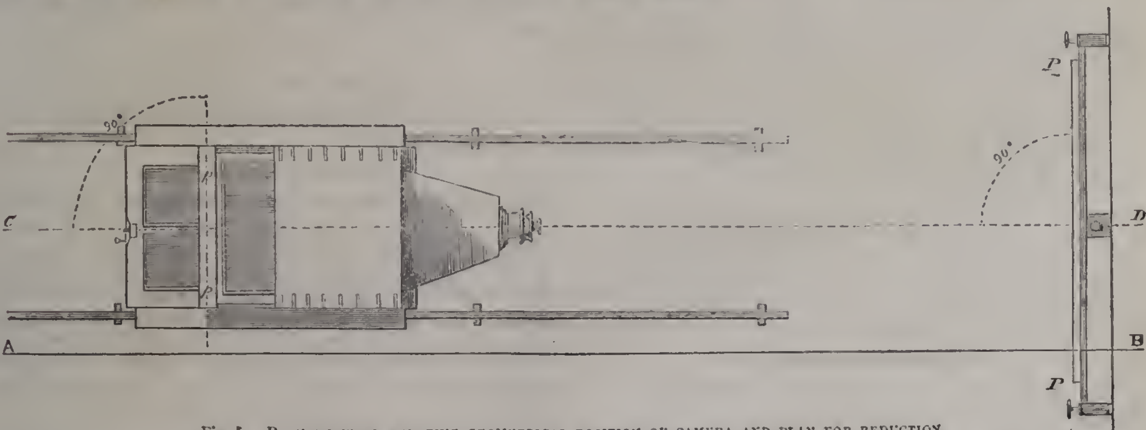


Fig. 5. Plan showing relative geometrical position of camera and plan for reduction.

C D. Line in plane of adjustment, passing through centre pin of plan-stand, centre of sensitive plate in camera, and coinciding with optical axis of lens.
P P. Position of plan on board. *p p*. Position of sensitive plate in camera.

SCALE, HALF-INCH TO A FOOT.

A little consideration will enable the operator to judge of, and to apply the movement required to produce parallelism from the position already referred to of the margin of the plan-image, relative to the margin of the rectangle on the glass. It has been already stated that a want of parallelism

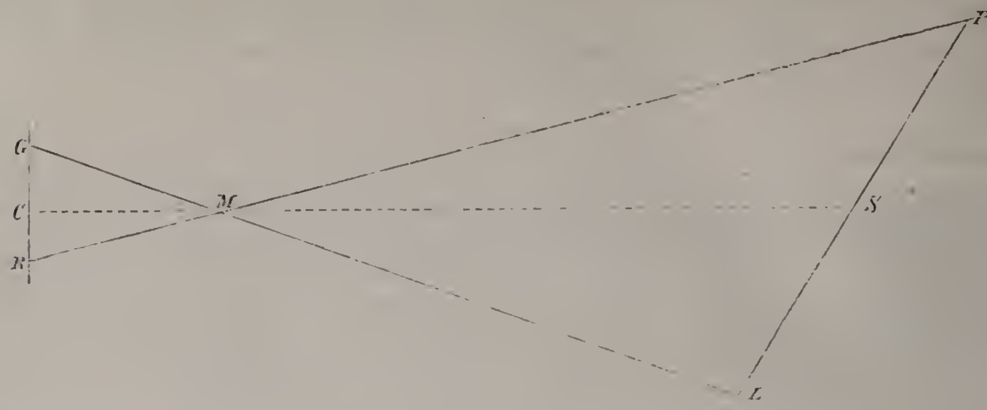


Fig. 6.

will be indicated by the margins not being at equal distances at all sides (the centres being co-incident), and it follows from this, that the mark representing the centre of the plan seen in the image will not be in the centre of the rectangular image. From the position of the margin with reference to the centre can be deduced the relative position of the surfaces of the plan and ground glass.

Fig. 6 is supposed to be either a plan or a section of the two surfaces; G R being the surface of the ground glass, M the lens, the optical axis of which, C M, is at right angles to the surface G R, and P L the plan; S the centre of the plan, and C the centre of the rectangle ruled on the ground glass. G R will be the image of the plan thrown on the ground glass, G and R being in the centre of opposite sides of the image.

Now it is evident, on inspection of the diagram, that when P R is greater than G L, G C is greater than C R; that is to say, that that edge of the plan (as P) is farthest from the ground-glass plate, of which the image (as R) is nearest the image of the centre of the plan.

By reasoning in this way it will be at once suggested to the operator what movement in altitude or azimuth is to be given to the camera to produce parallelism.

This movement will throw the centres of the plan-image and ground glass off each other; they are again made to coincide as before, and thus, by repeated adjustment, coincidence of the centres and parallelism of the surfaces is insured.

It then only remains to produce coincidence of the sides of the rectangles by the rack and pinion motion of the lens, and the screw for focussing the camera.

The adjustment is now complete, and it is only necessary to remove the focussing-glass, and to slide the sensitive plate into the same place to receive a correct reduced image.

The time taken in adjustment is about four minutes in the first instance, and one minute afterwards, for each change of plan, provided the ratio of the reduction is the same.

(*To be continued.*)

TRANSFERRING COLLODION POSITIVES.

When it is desired to transfer a positive picture to leather-cloth, it is necessary to change the collodion, and make it less adherent to the glass.

Alcohol in excess gives to collodion the property of spreading with facility, but the film very readily detaches itself from the glass. We apply this principle in the following formula, taking care to reduce the quantity of iodide:—

Alcohol	50 parts.
Ether	100 ,,
Gun-cotton	5 ,,
Iodide of cadmium	4 ,,

This collodion spreads very readily upon the glass, on account of the large proportion of alcohol.

The process is that usually prescribed: after sensitising, the plate is treated with bichloride of mercury, to obtain a whiter tone. The picture being finished, it is immersed in a bath of

Water	100 parts.
Sulphuric acid	10 ,,

In a few minutes the film tends to leave the glass; it is then removed from the liquid, and drained for a few moments.

Prepare a smooth piece of leather-cloth, well cleaned and coated with gum-water, prepared by dissolving

Gum arabic	1 ounce,
Water	5 ounces,

and floating the cloth carefully upon the surface: raise it quickly, drain, and dry it with paper. Then cut it to sizes a little larger than the picture.

The picture, while still wet, is placed horizontally upon a table; the cloth is then placed upon the collodion film, and adherence promoted by gently pressing and rubbing the cloth in every direction. The layer of gum adhering strongly to the collodion facilitates the operation, and it is only necessary to lift up the cloth to find the picture completely attached to it. Upon a black cloth ground it presents a very pleasing appearance. When dry, the picture is permanent. This operation is by no means easy, and the operator must expect to fail many times before he can command success.

DRY COLLODION PROCESS—WITHOUT PRESERVATIVE SOLUTION.

Under this title Mr. Sutton has published a process, the results of which he describes as being already very satisfactory, and which further experience may carry nearer to perfection. He employs an alcoholic collodion, iodised two months previously, which has assumed a pale tint, and is very adherent, without its sensibility being diminished. It is excited in a bath containing a trace of acetate of silver. The silver in excess is removed by immersing the plate in a bath of distilled water. The plate is allowed to dry, and is put aside for use: it must not be dried by artificial heat. Employed before being completely dried, it yields very perfect negatives.

The time of exposure is nearly the same as that required in other dry processes, perhaps a little less; or about six times as long as for wet collodion.

Before proceeding to develop the picture, a little varnish must be applied with a camels' hair pencil round the border of the collodion on the plate, to prevent its slipping off when moistened anew, as often happens when the iodised collodion is too newly prepared. In developing, the plate is first immersed in a dish of water for five minutes. It is then placed on the

horizontal stand, and a solution of pyrogallic and citric acids, with a drop or two of nitrate of silver, poured over it. The image makes its appearance slowly at first, but it soon becomes as intense as desired. Citric acid is recommended in preference to acetic, as the latter renders the film too tender. One part of citric to two of pyrogallic is a suitable proportion.

A very important point in this process is to plunge the plate into a bath after sensitising it, instead of pouring the water upon it.

In washing the film by the latter method, the nitrate of silver is removed irregularly, from which unequal strength in the development results; moreover, the water often contains light bodies in suspension, and, falling with force upon the plate, tears it, and causes holes.

Among the numerous preservative solutions hitherto recommended, Mr. Sutton is surprised at seeing no mention yet made of serum of milk, which, to him, appears the best of any. This fluid contains not only a sugar, or preservative syrup (sugar of milk), but also caseine (a substance analogous to albumen), and also the elements for forming a lactate of silver on the film.

Some time ago, Sir John Herschel, in his experiments on the solar spectrum, remarked the property possessed by lactate of silver of giving vigour to the luminous impressions. The same effect will, doubtless, be produced by employing serum of milk as a preservative solution. In any case, the hypothesis is worth verifying.

Lactate of silver is a soluble salt, and, in this respect, it differs from other organic salts of silver. It may be obtained by adding lactate of soda to a solution of nitrate of silver, or by dissolving oxide of silver in serum of milk. Its effect in the bath is to give vigour and consistency to the film. It is employed with advantage, in sensitising baths for paper positives, and in the dry process, where gallic acid replaces pyrogallic acid.

The exposed plates, when no preservative solution has been employed, may be developed by immersing them in a bath of proto-sulphate of iron, acidified with acetic acid, and containing a few drops of nitrate of silver. The image appears feebly in all its details, and requires to be strengthened subsequently.

Mr. Sutton considers that he can obtain greater sensitiveness in the dry process, by employing an alcoholic collodion containing a little bromide of ammonium, and in sensitising with a bath almost neutral, or containing a slight trace of nitric acid; in washing the plate without using any syrup, and in developing with iron, strengthening after fixing by means of repeated applications of pyrogallic acid, to which nitrate of silver is added.—*La Lumière*.

ON THE PREPARATION OF PURE SILVER.

BY M. E. PELIGOT.

The silver alloyed with copper is dissolved in nitric acid. It is better to operate upon large than upon small quantities, about a pound is a convenient quantity, for the purification of a large quantity is easier and surer than a small one. The solution diluted with distilled water is left to repose; it is then decanted upon a triple paper filter, in order to separate the least traces of gold it may hold in suspension; the filtered liquor is received in a glass vessel, holding at least one gallon, which is almost entirely filled with distilled water. The addition of ordinary hydrochloric acid precipitates the metal in the form of chloride.

The precipitate carefully divided by agitation, being collected at the bottom of the vessel, the clear liquid is carefully decanted with a glass syphon. Washing with rain or river water is continued until prussiate of potash fails to show the least trace of copper. The chloride of silver is then put into a porcelain capsule, and the water that separates from it removed with a pipette. After desiccation in a *bain-marie*, it is reduced by chalk and carbon: 100 parts of dry chloride of silver require 70 parts of chalk, and 4 of pulverised wood-charcoal. The silver obtained is washed, re-melted under carbon, and cast into plates.

This operation, when carefully performed, will generally furnish silver of absolute purity $= \frac{1000}{1000}$. This is ascertained by comparing it by means of analysis by the moist way, with pure silver, from a previous preparation. If the standard of the two specimens be not identical, the new one having a little lower standard, however trifling the difference, the silver must be again dissolved in nitric acid, and submitted to a series of operations about to be described. The purity of the silver is ascertained by its complete identity with the silver with which it is compared.

It is useless to add, that if we have not silver $= \frac{1000}{1000}$ at command, we must again dissolve that which we have obtained, reserving a small quantity. The revivified metal is compared with that obtained by the first operation. If the two specimens are identical, the purity of one implies that of the other. If the silver obtained by the new operation is of a little higher standard, a few grains of it are reserved, and the rest dissolved, and the process continued until the two specimens are exactly alike. Such is the theory of this operation; but, in practice, two treatments always suffice to yield silver in a state of purity.

As analysis by the moist way easily produces a difference of a quarter of a thousandth, silver obtained by following this process is not satisfactory if it contains more than that quantity of foreign matters. No other substance probably exists, the purity of which can be guaranteed by so rigorous a test.

This method is easy and sure, and not expensive, as the re-agents are of the cheapest kind; the operation is rather long, but in the preparation of so important an article as pure silver, time is no object.

Dictionary of Photography.

Nitrate of Cadmium.—A deliquescent salt formed by the combination of nitric acid with the oxide of the metal cadmium. It is formed in the nitrate bath when a collodion containing iodide or bromide of cadmium is immersed in it by some operators it is thought to produce *fogging*.

Nitrate of Copper.—A salt formed by the combination of nitric acid with oxide of copper, forming crystals of a beautiful blue colour, which are very soluble in water. It is a very caustic salt, corroding the skin, and its taste is exceedingly styptic. It is not much employed in photography, although it has been introduced into some formulæ, together with tartaric and pyrogallic acids, for developing collodion negatives.

Nitrate of Iron.—There are two nitrates of iron: the nitrate of the protoxide of that metal, and the nitrate of the peroxide. The first, usually called the proto-nitrate of iron, appears in crystals of an emerald green colour, and may be readily obtained by adding a solution of nitrate of baryta to a solution of proto-sulphate of iron. It is a deoxidising agent, employed to develop collodion positives.

Nitrate of Lead.—A white anhydrous salt, formed by the combination of nitric acid with protoxide of lead. It crystallises in regular octohedrons. It is soluble in seven times its weight of cold water, and is much more soluble in hot water. Heat decomposes nitrate of lead into hyponitric acid, which passes off, and protoxide of lead, which remains. It is sometimes substituted for nitrate of baryta, in the preparation of a positive developer; and it is also added by some photographers to gallic acid, to increase its developing properties, giving much softness to the appearance of the proofs.

Nitrate of Magnesia.—This salt is prepared by dissolving oxide of magnesium, or white magnesia, in nitric acid; it consists of one equivalent of nitric acid, combined with one equivalent of the base: it is very soluble in water, and deliquescent, and was once in vogue as a preservative agent for negative collodion plates.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 16*th April*, 1860.

The recently-published *Annuaire du Cosmos* gives us the following ingenious remarks "On the colour of dresses compared to the tints of the face," which I extract almost literally:—The chemical action of white light is proportional to its luminous intensity; but the same cannot be said of coloured light. The most luminous or brilliant colours have hardly any photogenic action, whilst those less brilliant are extremely active. Hence the red, orange, and yellow rays make little or no impression upon the sensitive plate; whilst the blue, indigo, violet, and invisible rays of the spectrum act upon this plate instantaneously. In other terms, the three most brilliant colours of the artist's palette are in photography, on the contrary, the three obscure tints, and, reciprocally, the three dark tints of the painter are the most brilliant colours of the photographer.

White, the re-union of all the colours, exercises a vivid photographic action; black, or the absence of colour, does not act upon the silver plate; yellow, orange, &c., may be called inert colours.

If the model possesses a brilliant complexion, a red or rosy tint, and, at the same time, be dressed in dark colours, it will be difficult, if not impossible, to obtain satisfactory results. The face will, in all probability, be completely solarised before the dress is well sketched in. To insure a harmony of tones with a pure white face, the dress must be, as much as possible, composed of photogenic colours. We must not only pay attention to the colour of the stuffs, but also to their nature. Thus, the face, however brilliant in colour, may yet succeed tolerably if the person's dress is of glossy silk, though of an anti-photogenic colour.

There is a way in which we can lessen this strong opposition of tone between the face and the dress. It consists in taking a small screen of black cardboard fixed to a slender black handle, and moving it rapidly before the face of the model during the last moments of exposure. The luminous action will be thus reduced over the face in such a manner that the dress undergoes a little longer exposure.

There is another important consideration: the time of exposure. It is well known that the longer the time of exposure the weaker the image obtained will be. Thus, if an image has failed, if there is too great a contrast of tones, we may generally conclude that the time of exposure has been too short. As the length of exposure increases, this contrast becomes weaker and weaker, until as a last result we obtain the most insipid uniformity of tone.

This law must be more especially taken into account when we desire to obtain complete harmony in a landscape where certain striking contrasts might render the results doubtful. Thus, white buildings dispersed amidst a mass of verdure, are frequently a cause of failure to the landscape photographer. In such cases, we must not pay too much attention to the white masses, but give an exposure long enough to obtain all the details of the green foliage; we are thus almost sure of avoiding the cause of failure in these landscapes. We might add, that the length of exposure must in general be proportional to the striking oppositions of tones.

M. Berthelot has recently effected the synthesis of hydroiodic ether, by means of carburetted hydrogen (olefiant gas). This interesting experiment is thus made:—Into a retort with a long neck is introduced an hermetically-sealed tube, containing about 20 cubic centimètres of a saturated solution of hydroiodic acid. The neck of the retort is then made very narrow at a certain point, by the aid of the blowpipe, and the retort then filled with pure dry olefiant gas; after which, it is hermetically closed at the narrow part by the flame of the lamp. The whole apparatus is then carefully shaken, so as to break the tube containing the hydroiodic acid, and the retort placed in a water-bath, where it remains exposed to the heat of boiling water for 50 hours. At the end of this time the synthesis is effected; the retort, in which a vacuum has been produced, is opened, a solution of potash is introduced, to saturate the excess of hydroiodic acid, and the hydroiodic ether separated. The following formulæ indicate what takes place in this beautiful synthesis:—

$$\underbrace{C^4H^4}_{\text{Olefiant gas.}} \quad + \quad \underbrace{HI}_{\text{Hydroiodic acid.}} \quad = \quad \underbrace{C^4H^5,I}_{\text{Hydroiodic ether.}}$$

The following letter has just been communicated to the *Academy of Sciences* by M. Palmieri, of Naples (or rather, of Vesuvius—for this *savant* literally lives upon the mountain). The letter is addressed to M. Ch. St. Claire Deville, member of the Institute:—

"Since the 1st of May, 1858, Vesuvius has not ceased throwing up lava from the basis of the great cone. The *Fosso grande* has disappeared, the road no longer exists. The fumarolle have evolved ammoniacal salts, large quantities of salts of copper and lead, but little iron. In them have been found selenium and titanium. Those parts of the lava of the fumarolle of 1855 which have not been covered over by the lava of 1858, have still a very high temperature."

M. Palmieri announces also the publication of the first volume of the Annals of the Royal Observatory of Vesuvius, of which he is the director. On the night of the 9-10 April last, we had an *aurora borealis* at Paris, which, however, I was not fortunate enough to observe. M. Coulvier Gravier, who is always on the look-out for falling stars, has made a very good observation of the phenomenon. It began at a quarter-past eight in the evening, by a streak of white light. At forty-five minutes past nine, the whole disc disappeared, but was seen again soon after in all its splendour. It varied constantly in intensity during its entire appearance; its height above the horizon was not considerable, but it extended from the north to the north-west.

During this aurora, M. Coulvier Gravier saw a falling star shoot past beyond one of the rays of the northern light. The meteor was eclipsed by the light of the aurora, behind which it passed, but reappeared during the remainder of its course. This furnishes a new proof of the fact formerly announced by the author, that meteorites, aerolites, or falling stars, become incandescent whilst in a region higher than the zone in which the aurora borealis shines.

DAVANNE AND GIRARD ON FIXING POSITIVES.

To the Editor of the "Photographic News."

Sir,—At the last meeting of the North London Photographic Association an attempt was made to throw discredit upon the valuable researches of two eminent French chemists on the important subject of the power of hyposulphite of soda to fix positive proofs. Had proper means been taken to prove that the statements made by these chemists are wrong, there would be no cause to complain; but the proofs of error adduced by Mr. Dawson are so futile, that they make us tremble for the reputation of British chemists, amateur or professional.

In the first place, as you pointed out in No. 82, MM. Davanne and Girard's statement is misunderstood or misrepresented. Their words are:—"When a solution of hyposulphite of soda, of the strength of 10 per cent. (equal to two ounces to the pint), is used to fix a proof, by removing from it the salts of silver not acted upon by light, it becomes a solution—*not of chloride or nitrate of silver in hyposulphite of soda, but of the double hyposulphite of silver and soda in hypo.* Now, direct experiment establishes the fact, that the real saturation of hyposulphite of soda *by this double salt* is very rapidly attained; for by placing *a large quantity* of chloride of silver, recently precipitated, in a solution of hypo. of 10 per cent., filtering, and leaving the liquor to stand, we discover that in a very short time a large quantity of the double salt is deposited in the state of very pure white crystals. If we then proceed to test the

richness of this liquor, which does not undergo any change in the air, and which must be considered as corresponding to the saturation of the hypo. by the double salt, we are surprised to find that at 60° F. this solution contains no more than 1·798 grammes (27·75 grains) of silver per litre (35 ounces), which corresponds to 2·389 grammes of chloride of silver for 100 grammes of new hyposulphite (36·86 grains to 1543·2 grains,) nearly 2·4 per cent. Now, as a sheet of paper, after being sensitised, contains only 1·82 grammes of chloride of silver (27·77 grains), when a sheet and half is immersed in a litre (35 ounces) of solution of hypo. of 10 per cent., the latter will be saturated with the double salt, 27·77 + 13·88 = 40·65 (it is saturated with 36·86 grains)."

Now, all that this statement asserts is, that 1543 grains of hypo. crystals will only dissolve nearly 37 grains of chloride of silver *without becoming saturated with the double salt of hyposulphite of soda and silver.* It is not said that the solution *does not dissolve more chloride of silver;* for, on the contrary, the statement goes on to say:—"It does not follow that the bath is now incapable of dissolving a fresh quantity of chloride or nitrate of silver. Far from that, it will continue to *dissolve* very considerable quantities; and herein lies the danger: the hypo. bath will continue *to fix a great many more* proofs, *but not permanently*, for it is now super-saturated with the double salt, and is in a very unstable condition, and endeavours to return to a stable condition—a tendency which manifests itself by a slow but steady decomposition; . . . . for with every addition of chloride of silver to the hypo., beyond the quantity necessary to saturate it with the double salt, the bath will deposit, not the double salt, but hyposulphite of silver, which is immediately decomposed into sulphur and sulphide of silver, and sulphurises the proofs." Be it understood, then, that 37 grains of chloride of silver are sufficient to saturate, with the double salt, 35 ounces of solution of hypo. containing 3½ ounces of crystals (10 per cent.). Chloride of silver is more soluble than the double salt in solution of hypo.; therefore you may go on adding proofs, and, consequently, more chloride to the bath, but every proof added, helps more and more to decompose the bath and liberate sulphur.

Now, sir, this is all very clear, and patent to every chemist who can comprehend the laws of chemical decomposition. Let us see how Mr. Dawson proceeds to prove the French chemists to be in the wrong. Mr. Dawson says, if his calculation be correct, Messrs. Davanne and Girard positively assert that 4 ounces of hypo. crystals will only just fix ten pictures, 8½ by 6½. Referring to the above, you will see that they do say so; and the chairman *sarcastically* remarked, "that he doubted if any one believed it." Of course, *he* did not believe it; but let him set them right if they are wrong. Are we to suppose that Messrs. Davanne and Girard can be taught chemistry by Mr. Shadbolt? *Credat Judæus!* Mr. Dawson proceeded to the test: he took 96 grains of hyposulphite of soda and dissolved it in half an ounce of water, as the equivalent to 8 ounces of hypo. to the pint (the exact ratio is 87½ grains); for 8 ounces contain 3500 grains, and the ounce 437·5; therefore, 437·5 × 8 = 3500 ÷ 40 = 87·5 grains. Now, it will be observed that the strength of Mr. Dawson's solution of hypo. was not 10 per cent., but 40 per cent.; and he found that it continued to *dissolve chloride of silver* up to 45 grains. Messrs. Davanne and Girard say the same—viz., that 35 ounces of solution of hypo. at 10 per cent., which is equivalent to 3½ ounces of hypo. crystals, will dissolve 772 grains of nitrate, equal to 648 grains of chloride of silver; therefore, if 87·5 : 45 :: 1531 : 787, which is the same as saying, if Mr. Dawson's 87½ grains of hypo. dissolved 45 grains of chloride, M. Davanne's 3½ ounces (1531 grains) dissolved 787 grains of chloride, or thereabouts, for the exact amount was not measured. Thus far, then, there is no discrepancy in the statement put forth by Messrs. Davanne and Girard: with the main question Mr. Dawson has not dealt. What he has to do to prove MM. Davanne and Girard in the wrong is this:—Will 3½ ounces of hypo. crystals dissolve *more* than 37 grains of chloride of silver without becoming saturated with the double salt of hyposulphite of soda and silver? This is the real question at issue, not whether 3½ ounces of hypo. crystals will *dissolve* more than 37 grains of chloride, because we all know that it will, and nearly twenty times as much. At present, it certainly appears as if Mr. Dawson had discovered what is vulgarly called "a mare's nest."

An Absent Member of the N. L. P. Society.

Proceedings of Societies.

Blackheath Photographic Society.

The annual general meeting of this Society was held at the Golf Club-house, Blackheath Hill, on Monday the 16th inst., the President, J. Glaisher, F.R.S., in the chair.

The minutes of the last meeting were read and confirmed.

Messrs. C. Busk and H. Williams were appointed to audit the accounts, which were left in their hands for that purpose.

The Treasurer, Mr. J. B. Spencer, having resigned his office, it was moved, seconded, and carried unanimously, that the Secretaries, Mr. T. R. Wheeler and Mr. Travers B. Wire, be requested, jointly, to act as Treasurers; and the bye-law was modified which has reference to that office.

A vote of thanks was tendered to the Secretaries, for their labours during the past year.

The Report of the Council was then read and approved. It was moved, seconded, and carried, "That the Report just read be received, adopted, printed, and circulated."

A balloting-list of officers was then submitted to members, the President, Mr. Glaisher, retiring from office, pursuant to the laws regulating the Society. It was moved by Mr. J. Harding, seconded by Mr. H. Williams, and carried *nem. con.*, "That the best thanks of this Society be tendered to J. Glaisher, Esq., for his able, impartial, and conciliatory conduct, while in occupation of the chair of this Society."

Mr. Glaisher responded in suitable terms and then vacated the chair, indicating Mr. Heisch, F.C.S., as the gentleman upon whom the chair of the Society fell as his successor.

Mr. Heisch, on taking the vacant chair, briefly addressed the meeting, stating that he had great pleasure, as his first act of office, in calling upon Mr. Hardwich, who had most kindly come down, to read a paper before the Society.

Mr. Hardwich then proceeded to read the following paper

On the Present State of Our Knowledge Regarding Photographic Collodion.

Mr. President and Gentlemen,—Although not a member of your Society, I have asked and obtained permission to read a paper this evening upon collodion, being fully convinced that the interests of the art require a better understanding of the modes used for preparing that substance, and also a more perfect agreement between the various formulæ. At present, it is almost impossible to compare the experimental results of photographers, or to deduce any general principles from them, seeing that scarcely two can be found who agree in their mode of working. I propose, therefore, to lay before you for discussion an outline of what has been certainly ascertained as regards the manufacture of photographic collodion.

For a long time subsequent to the discovery of the collodion process by Archer, the whole chemistry of the subject was imperfectly understood; and, even on the main question of the constitution of pyroxyline, opinions were divided. In 1854 Mr. Hadow published his researches, establishing beyond the possibility of a doubt the true nature of pyroxyline as a substitution compound, and proving the existence of at least four varieties of that substance, ranging from xyloidine up to gun-cotton; the lower compounds containing less, and the higher compounds more, of the peroxide of nitrogen. Besides these varieties, it was shown that the properties of photographic pyroxyline are much affected by the temperature at which it is prepared, and that the same acid gives a different result accordingly as it is used hot or cold.

Subsequent to this, Dr. Norris, of Birmingham, sent two communications—the one to the *Journal of the Photographic Society*, and the other to another photographic journal—in which he called attention to a point not before noticed, viz., the superior value in collodion of the substitution compound nearest to xyloidine, to that containing more peroxide of nitrogen, and approaching to gun-cotton in composition. This point may not, perhaps, at first appear of great importance, but, in reality, it is so; and any maker of collodion who chose to neglect it, would fail in producing a first-rate article.

Whilst these investigations were being carried on, many of the manufacturers of negative photographic collodion prepared pyroxyline from paper or linen, finding by experience that it was difficult, when using cotton wool, to secure that intensity of the image which the operator requires. The reasons why paper—described by chemical authorities as identical with cotton in its composition—should yet act differently in this process, need not engage much of our attention; it will be sufficient to state that the difference is probably due, in part, to the weakening which ensues when the nitric acid touches the outer portion of the fibre, and in part to the fact of paper being often made from cellulose in a semi-decomposed state, or from *linen*, which has been proved to yield a pyroxyline of different properties from that furnished by cotton.

My own experience, as a maker of collodion for three years, enables me to speak with confidence against the employment of any materials which give intensity to collodion in virtue of some principle of decomposition; for—to say nothing of the difficulty of obtaining these substances in a uniform state—it is certain that the stability of the collodion is lessened by their employment; just as nitroglucose, a product of the action of nitro-sulphuric acid on sugar, is more unstable than pyroxyline, so is pyroxyline made out of old calico or linen more unstable than pyroxyline prepared, in the same acids, from cotton wool. Pictures of first-rate excellence have been taken with collodion from linen, but I cannot now recommend such collodion; for, on attempting to export it to distant climates, or subject it to great heat in our own country, it is apt to undergo a spontaneous decomposition, even when kept in tho plain state in a dark place, and without any addition of iodiser. A knowledge of this uncertainty in some kinds of collodion is highly useful, because it prevents the maker from placing dependence on a formula which would eventually disappoint him. It is probable that photographers, trying such a formula, will be pleased with it; but let them send the plain collodion for a voyage round the world, and try to work with it again on its return, when they will probably find it in a gelatinous state, or in a state of semi-liquefaction, and so highly ozonised as to be useless for any purpose.

We are, therefore, bound to discard all unstable materials, and to return once more to the cotton wool, which must, by some means or other, be *coerced* into the proper state. That this could be done, was, I believe, known many years ago to individuals; but, if so, it was not published. I have stated, on a previous occasion, that the process for making intense negative collodion from cotton wool was suggested to me, in the first instance, by the experiment of soaking paper in diluted sulphuric acid, and subsequently converting it into pyroxyline. The nature of the change produced by the sulphuric acid on the cellulose is not known, but it has the effect of increasing the intensity of collodion made from the resulting pyroxyline, and of imparting those qualities of negative which I have spoken of in connection with decomposed materials, like old cambric. Fortunately, the pyroxyline from the fibre parchmentised by oil of vitriol, is more stable than that from linen, and has been proved to stand as well in collodion as most other kinds of pyroxyline which the photographer is accustomed to employ.

But, in addition to an action of the sulphuric acid in this process, I have lately succeeded in proving that a hot and weak nitric acid may also exert a very peculiar effect, and one which is almost exactly the reverse of that produced by the oil of vitriol. To show this action of weak nitric acid, three volumes of pure nitric acid of 1·45 may be mixed with a volume of oil of vitriol,* heated to 150°, and pyroxyline from the formula which I shall presently describe as No. 1, immersed in it for a few seconds. This treatment causes very little change in the appearance of the pyroxyline; but, when made into collodion, it is found to have lost its characteristic toughness, and to have become weak and rotten. Further than this, the negatives are no longer sharp and intense, but feeble and metallic in appearance.†

The above facts are of more importance, as regards the manufacture of photographic collodion, than would at first be supposed; for it can be proved that those actions which have just been attributed to sulphuric acid and weak nitric acid respectively, may be secured at will by modifying the composition of the nitrosulphuric acid. If a strongly-parchmentised product suitable for making intense collodion be desired, the bulk of diluted oil of vitriol in the mixture must be considerably greater than that of the diluted nitric acid; whilst, if it be required to prepare a porous collodion to remain a longer time without becoming surface-dry, and to yield an image with less violent contrast of light and shade, then the proportion of weak nitric acid may be increased. Observe, also, that these differences are not due to variations in the temperature, or in the degree of concentration of the nitrosulphuric acid, both of which are supposed to be the same.

The following table exhibits the composition of five different mixtures of sulphuric and nitric acid in which an attempt has been made to graduate the proportion of water, so that the per-centage of peroxide of nitrogen imparted to immersed cotton fibre may be the same in each. The table may not, perhaps, be absolutely correct, since it is very difficult to judge precisely of the strength of nitrosulphuric acid, on account of its solvent action on cotton varying not only with the temperature and quantity of water, but also with the quantity of diluted oil of vitriol present. The safest plan, therefore, appeared to be to neglect all theoretical calculations, and to construct the table by simple experiment, taking care in each case to work with the maximum quantity of water, and stopping the addition of water only when it was found that the product left a thick sediment on being dissolved in ether and alchohol. This plan will probably be found to answer for the three upper members of the series, and the two lower members are not of much practical importance.

COMPOSITION, BY VOLUME, OF NITROSULPHURIC ACID FOR PREPARING PHOTOGRAPHIC PYROXYLINE.

	Oil of Vitriol, 1·845 at 60 F.	Pure Nitric Acid, 1·45 at 60 F.	Water.
No. 1	... 3	... 1	... $\frac{7}{8}$
No. 2	... 2	... 1	... $\frac{5}{8}$
No. 3	... 1	... 1	... $\frac{5}{16}$
No. 4	... 1	... 2	... $\frac{5}{32}$
No. 5	... 1	... 3	... 0

The pyroxyline yielded by each of these five mixtures is soluble in glacial acetic acid, and also in boiling absolute alcohol; whilst in neither case does the resulting collodion produce an opaque film. The substitution body formed is therefore a little above compound D or xyloidine, but not above compound C. A more careful examination, by immersing dry cotton at low temperatures, seems to indicate that if there be a difference, No. 1 is somewhat stronger than No. 5. The collodion, however, from No. 1 is more fluid than that from No. 5, thus showing that other causes, besides temperature and dilution of the mixture with water, have to do with flowing properties. A greater amount of fluidity than exists even in the collodion from No. 1 may be produced by dipping the pyroxyline first in No. 1, to secure the full action of the sulphuric acid, and afterwards in No. 5; the weak nitric acid will then act more decidedly than it would have done upon the cellulose previous to the parchmentising process.

The temperature employed for the above table of acids may be 150° F.; and, in making the pyroxyline, we find that the lower numbers give a product which has an opaque appearance; whereas, the pyroxyline made by No. 1 and No. 2 exhibits no opacity. The five samples of collodion differ very much in the rapidity with which they set upon the glass, and also in their physical structure; the first setting rapidly and producing a horny film; the last scarcely possessing any power of setting, and giving a soft, pappy film. The only way of overcoming this, and putting them on something like a par, is by varying the proportions of ether and alcohol in the solvents, using more alcohol in the former, and more ether in the latter. These collodions also differ very materially as regards the intensity of the negative image, which increases as you ascend the scale.

These disjointed remarks have been thrown together, not with a view of exhausting the subject, but simply to assist in reconciling some of the extraordinary discrepancies in writings on collodion; for, whilst one author advises that at least three parts of alcohol be employed to one part of ether, another (a French author) says that the art of making good collodion is in reducing the alcohol to the lowest possible limits, and employing scarcely anything but ether. Others, again, have written as if all depended upon the iodising solution, and have distinguished between the quality of negative produced by iodide of potassium and iodide of ammonium, or between iodide of potassium simply, and the same compound containing iodide of silver dissolved. Not that I mean to affirm that the nature of the base is of no importance at all, because there are secondary reactions between the base and the pyroxyline, but simply that the particular iodide employed is of minor consequence as compared with the mode of making the pyroxyline.

The reasons which induced me to fix upon the formula for nitrosulphuric acid, marked No. 1 in the table, were principally these: I was assured by those who professed to be acquainted with the wants of the public, that a collodion was needed which would produce a dense negative in a rather dull light; for that the practitioners of the art in this country had to perform their work, as a rule, under great disadvantages in that respect, and it was comparatively easy to reduce the intensity when in excess, but more difficult to increase it when deficient. The highly-parchmentised pyroxyline appears to me to have an organic reaction towards the salts of silver somewhat greater than that of the other varieties, and I attribute the tendency to redness in the negatives to that cause. It has not been proved to be so, but the idea may be entertained, seeing that the action of diluted sulphuric acid is known to change cellulose into dextrine, and both dextrine and gum impart a red colour to a collodion negative when applied to the surface of the partially-washed film.

If we allow that great intensity of negative ought always to be at our command, yet there are other modes of obtaining it without

* In attempting to produce this change by means of nitric acid alone, it will be found difficult to prevent the cotton from being dissolved. Pyroxyline is easily soluble in dilute nitric acid, but the addition of a little diluted sulphuric acid throws it down again, so that sulphuric acid in small quantity lessens the solvent action, independently of abstracting water.

† In addition to this modified pyroxyline produced by hot nitric acid mixed with a little sulphuric acid, I find that a remarkable change of properties may be produced by the pure nitric acid of 1·45 employed cold, and without any admixture of sulphuric acid. The pyroxyline gradually becomes opaque, and loses its solubility in ether and alcohol; eventually it dissolves in the cold nitric acid without any evolution of gas, and, if water be then added, opaque white flakes are thrown down, which, when treated with ether and alcohol, simply swell up without passing into solution.

purposely modifying the pyroxyline, and therefore the question becomes, which is the best? Glycyrrhizine was carefully tried, both in bath and collodion, but was condemned as delusive in the long run, although promising well in the beginning. Neither could confidence be placed in ether containing organic impurities, although I have heard it said that the cheaper and more highly-methylated qualities of ether, as they were made some years back, gave better and more intense negatives than pure ether. Rejecting both of these expedients as being uncertain, and also fatal to the integrity of the nitrate bath, it seemed preferable to produce the effect by modifying the pyroxyline, since this mode is found to injure the bath scarcely or not at all. Having adopted an intense pyroxyline, it is of the utmost importance to secure a pure ether; because, when the pyroxyline is of the organic kind, the ether must be free from organic impurity, or the collodion will be less sensitive, and the negative either too intense or highly solarised.

Granting for the moment that the question of pyroxyline is definitively settled,* there remains still an important matter to be considered in relation to photographic collodion. Are we to work with iodide only, or with mixed iodide and bromide? It seems certain that if bromide could be invariably used, we should at once emerge from many of those difficulties which now surround us; for the invisible image on the bromised collodion is of a comparatively stable kind, and is less affected in its development by those small, disturbing causes, which often upset, so to speak, the latent picture upon the simply iodised collodion, and cause it to present itself either with spots or comets, or a total reversed gradation of light and shade. During the past summer, it was my endeavour, as far as possible, to encourage the trial of bromised collodions, and, in most cases where the light was strong, the result proved satisfactory. When, however, the image of the camera was imperfectly illuminated, the experiments were, with some few exceptions, reported as unsuccessful, and the pictures pronounced weak and ineffective, unless the negatives had been artificially strengthened by bichloride of mercury, or some analogous process.

In conclusion, I would venture to ask the members of the Blackheath Society to lend their aid in settling this important matter. The present time is the best, because the interest of photographers has been aroused, and an opportunity seems to offer of establishing the manufacture of collodion upon a secure and well-understood basis.

At its conclusion, Mr. Heisch remarked—I have listened with great pleasure to Mr. Hardwich's communication, and while cordially agreeing with much that he has said, there are still one or two points on which my experience has led me to slightly different conclusions. I am not altogether prepared to discard the use of paper as a material for the manufacture of collodion, as I believe that there are certain properties possessed by such collodion, which cannot be secured by the use of cotton. I believe that a greater weight of pyroxyline may be dissolved in a given quantity of ether or alcohol, and still run well when we use paper, than when we use cotton, and this is often of importance. I have not found collodion thus prepared more subject to decomposition than any other, if proper care be taken to secure pure ether and alcohol. During the heat of last summer, my dark room was for a long time at a temperature of 96°, and in that room I kept and used the collodion, not only for wet but for dry plates, and got on perfectly well, while many of my friends using the same process with other collodion, were brought up by the heat, and could not use their plates. I have still by me collodion prepared eighteen months ago, and it shows no sign of spoiling. I do not mean to say I should recommend collodion such as I am now speaking of for all purposes; indeed, I fear it is impossible to obtain any collodion which will suit the requirements of all photographers, the circumstances under which they work being so different. Thus, a collodion admirably adapted for portraiture in a glass house, is hardly that which one would choose for copying new stone buildings in a bright sunlight, nor that, again, the same as for dark foliage; and it is a question if the requisite differences can be obtained with one pyroxyline by variations of solvents or iodisers, or if it will not be found necessary to vary the pyroxyline itself. The purposes for which I chiefly employ collodion are such as do not require any great amount of sensibility, but rather the capability of standing considerable exposure without solarising, so that the bottoms of deep holes of different colours may be brought out before the lighter portions are burnt up. The pyroxyline I employ is prepared with

*Nitric acid, sp. gr. 1430	39 parts.
Sulphuric acid	31 „

Swedish filtering paper is soaked in this for one hour at a temperature first of 130° to 135°, and allowed gradually to cool, keeping it well shaken for the first ten minutes, to bring fresh portions of acid constantly in contact with the paper. The solvent is ether, 5 parts, and absolute alcohol 3 parts, including that in which the iodides are dissolved. For very large plates I should use six grains of pyroxyline to one ounce of the solvent; for anything up to ten and eight inches, eight grains. This collodion, besides its non-liability to solarisation, is remarkably well adapted for dry processes, losing its sensibility less in drying than most. I have recently tried with this and another collodion iodised precisely in the same way, though the latter worked in one-third of the time when wet; after drying, it required nearly double the time requisite with my collodion. With regard to the question of bromides in collodion, the Society are aware that I have devoted much attention to the subject. I am not prepared to advise their use on all occasions, more particularly for portraiture; in landscape collodion, I think them always useful. I see no reason to doubt the truth of what I stated to the Society, on a former occasion, that they should be used in atomic proportions; for subjects in which greens predominate, two atoms of iodide to one of bromide I still believe to be the best; indeed, I should take this as a general landscape collodion. I may mention, as confirming this view, that, since I first published this formula, in 1852, several others, uninfluenced by theoretical considerations, but simply going on adding bromide till the best working point was reached, have published formulæ in which the bromide and iodide are precisely in the proportions above mentioned. For reds and yellows, I believe the proportion of bromide may be advantageously increased. Our late president, Mr. Glaisher, finds that for artificial light, in which the yellow is very predominant, 2 atoms of bromide to 1 atom of iodide give the best results. This formula was also arrived at purely experimentally. When, some time ago, Mr. Hardwich spoke on this subject, he thought I had recommended too large a proportion of bromide. I observe in his last formula he has much increased the quantity he first employed, and I am not without hopes of ultimately converting him to the "atomic theory" as applied to this subject.

A vote of thanks was cordially tendered to Mr. Hardwich for his able communication, and Mr. Vernon Heath having been duly elected a member of the Society, the meeting adjourned.

Glasgow Photographic Society.

The usual Monthly Meeting of the City of Glasgow and West of Scotland Photographic Society was held on Thursday evening, the 12th inst.; the Vice-President, A. Mactear, Esq., in the chair.

The Secretary, Mr. John Cramb, having left the country on a photographic tour in Syria, Mr. J. Spencer, jun., had consented to act for him till his return.

The minutes of the last meeting having been read and confirmed,

Mr. A. Robertson stated, that he understood Mr. Stuart had succeeded in producing successful pictures on ivory, and requested that gentleman to favour the meeting by describing the method adopted by him.

Mr. Stuart then handed round several portraits on ivory, uncoloured, many of which were excellent. His mode of operation is as follows:—The ivory is to be well polished with finely-ground pumice-stone, and to be entirely free from scratches. It is then soaked in a solution of gelatine, 10 grs. to the oz. of water, *using this hot*. When dry, it is floated on a solution of chloride of ammonium, 4 grs. to the oz. of water,

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* There are some points relating to the theory of pyroxyline for photography which it has been deemed advisable to omit on the present occasion, through fear of complicating the subject. For instance, an intense collodion may be made from pyroxyline prepared without any excess of sulphuric acid, if the amount of water be diminished, and the temperature raised sufficiently to disintegrate the fibre (a little chlorine in the nitric acid will assist in this disintegration). This material, however, appears less stable than the other, and, when examined, is found to contain a bitter product of decomposition in some quantity. Probably the acids convert a portion of the cellulose into grape sugar, which, when acted on by nitric acid of a certain strength, forms nitroglucose. The experience of the author is unfavourable to the employment of this pyroxyline in photography.

* The acid I employ is that called "acid nitros," of sp. gr. 1420, or thereabouts, made up to sp. gr. 1430, with pure nitric acid of sp. gr. 1500. I find this gives better results than acid which contains more of the lower oxides of nitrogen.

to which is added $1\frac{1}{2}$ grs. of gelatine. After lifting it from the salting bath, it must be dried before the fire, so as not to let the salting bath go too much into the ivory. It is then sensitised with a 60 grs. solution of ammonio-nitrate of silver, either by floating or brushing, *and dried immediately afterwards.* On the ivory thus prepared, print from a negative in the usual way, and tone and fix by any of the processes. The fixing of the picture requires about an hour. The picture is to be well washed in hot water, and to be left under running water for four or five hours. Mr. Stuart remarked, that the principal use of photographs on ivory would be for colouring; and having had the opinion of several artists, he was enabled to say that the method adopted by him did not at all injure the surface for colouring.

Mr. Macnab had also succeeded in producing good pictures on ivory, by a process somewhat similar to that of Mr. Stuart.

Mr. H. Wilson then showed and described the working of the first daguerreotype apparatus used in Glasgow.

A tent for making wet collodion in the field was exhibited by Mr. Harley; it only measured, when shut, 24 inches long by 13 deep, and 4 inches thick, and contained a folding camera, &c.

Stands for the operating room were shown by Mr. Stuart and Mr. Combe.

A number of very beautiful photographs by Mr. Mactear were handed round. These views had been done by the wet collodion process, in a portable tent of Mr. Mactear's construction, which is placed on a child's perambulator, and can be easily wheeled about. Stereo-slides of the tent and perambulator were exhibited.

The Treasurer, Mr. A. Robertson, exhibited an apparatus for taking eight pictures on one piece of glass. It was a dark cell for an ordinary camera. The plateholder part is circular, and is turned by a nob on the door, which closes on the plate. There is another piece of wood between the *slides* and the plateholder, which has a space cut out like the letter V, or an eighth of a circle. This thin board shuts off the light from all but the eighth of the plate. When the sitter is placed, and the cell in the camera, the slide is drawn up and the cap removed. Having exposed the proper time, replace the cap and turn round the plateholder an eighth; expose another section, and turn till you have gone over the whole eight divisions.

Mr. Robertson said this was no new thing, being practised in America and elsewhere. He had been induced to try it from having seen a picture done in this way. He had never seen it described, and had made this cell to show the meeting the method he had adopted.

A camera suitable for stereoscopic work, and also adapted for taking six pictures on a half-size glass, with specimens of its production, were shown by Mr. Macfarlane. This camera was much admired for its neat and very compact arrangement.

A discussion took place among the members relative to the best form of stand for the operating room.

Mr. Stuart proposed five new members to be balloted for at next meeting.

A vote of thanks having been passed to those gentlemen who had exhibited apparatus, and

The Chairman having intimated that the next meeting (the last of the session) would be held on the first Thursday in May, the meeting separated.

South London Photographic Society.

Last evening, the usual Monthly Meeting of this Society was held in the Lecture Hall, Walworth. The Rev. F. F. Statham, President of the Society, occupied the chair.

The minutes of the last meeting having been read and confirmed—

The Secretary read the rules drawn up by the Committee appointed for establishing an Exchange Club, and announced that Mr. Hannaford had kindly consented to act as Secretary. The Secretary also stated, that the Committee suggested the propriety of dispensing with the usual three months' recess, and holding the meetings in the open air, within a few miles of the town, so that they might be enabled to put into practice the knowledge which they had acquired in the Society. These open air meetings would, he had no doubt, tend to advance the science of photography; and as ladies would be enabled to accompany the members, the pleasure derived would be considerably enhanced. It was suggested that the meetings should be held upon the third Saturday in each month, commencing in July.

Upon the motion of Mr. Hannaford, it was agreed that the next meeting should be made special, to take the question into consideration.

The Secretary said he had brought for presentation to the folio of the Society a copy of a print taken by Mr. Sutton's new panoramic lens and camera. He was of opinion that the parent Society had scarcely done justice to this invention.

Mr. Howard then read a paper on

Amateur Photography.

He commenced by saying, that with all the multiplicity of attractive forms in which the subject of photography had been introduced to the photographic and would-be-photographic public —all tending to show how easy it was to commence the study, how portable the apparatus, how pleasant to secure the features of friends, and to depict the beautiful and charming scenes that in holiday rambles might be visited—yet, the amateur's labours, in a majority of instances, had been only "black fingers and spotted linen." He was afraid that any remarks he could make would not tend to smooth the path of the amateur of its intricateness, any more successfully than could be obtained in the cheap works published upon the subject; nor would he say much upon the manipulating processes, which had already formed, and, he hoped, would continue to furnish, subjects for many interesting and instructive papers amongst the members. What he was more particularly desirous of drawing the attention of amateurs and beginners to was, that in commencing photography, if they really wished to produce pictures, they must make up their minds for some hard work and vigorous study; for to secure a good photograph was not so easy a pursuit as some might imagine. He would direct their attention for a moment to the patronage which photography had already received at the hands of amateurs; the numerous advertisements commencing "To Amateur Photographers;" the many perplexed and distressed correspondents to the four journals devoted to the subject; all proved to what a great extent it was practised. Persons with leisure at their command, and of a scientific turn of mind, had frequently applied themselves to the study of chemistry, electricity, magnetism, and sundry other delightful pursuits, and by their researches and discoveries had added greatly to the store of knowledge already possessed on those subjects; but the students in those several branches bore no comparison to the number of amateur photographers. This could not arise from any greater ease or facility presented for the acquirement of photography, for there were few of these branches of knowledge which could not be mastered with much less difficulty. The assertion that the successful pursuit of photography, though attended with greater difficulties than the subjects he had enumerated, still secured a more numerous host of votaries, might seem strange; in fact, one would be inclined to suppose that the reverse would be the case. But the true secret was, that, when arrived at, the results of photography were much more pleasing—affording a fund of delightful enjoyment, not only to the amateur himself, but also to his numerous friends, acquaintance, and, in short, every one to whose inspection they were submitted. Results were produced which the most accomplished artist could never reach. Thus the amateur found himself possessed of a source of infinite amusement and instruction; combining healthful exercise with close study and research; and from the multiplicity and varied features of its application, a never-failing employment for his leisure hours. But, with all these incentives to study, the successful pursuit of photography necessitated a constant attention to the subject; for he was no true amateur who did not follow his art closely, watching and ready to avail himself of every change and improvement that may tend to increase his knowledge. This involved far more attention and painstaking than he was afraid many amateurs felt disposed to give. He thought that much better photographs would be produced than were now sometimes seen as amateur productions, if they were not satisfied with average results. That the most successful results could be arrived at, he was certain. It did not do to be content with average results, and plead that you were only an amateur. If determined to produce pictures, do insure their being creditable. The reminiscence of a tour in the country, the portrait of a friend, the copy of a print, would be much deteriorated in value if compelled to be prefaced by the apology, "I am only an amateur," instead of trying again to produce a better. It had been said that, if we could only see our faults, we were in a fair way for correcting them; and he would, therefore, especially encourage and recommend amateurs to compare their productions with those of the best professional photographers, and say to themselves, "This is a bad photograph—I must try again;" instead of placing it in their collection, with the remark, "It is pretty well for an amateur." Amateurs seemed likely, from

their number, to form a large proportion of the public, whose admiration was alike an incentive to the exertions of first-class photographers, and a corrective to inferior productions, of which, alas! they saw so many. Amateurs, he thought, could do much in this matter; for a higher standard would be demanded if they would ignore their indifferent productions, place before their friends good specimens, and thus prove to them that photography could produce something to admire. He would advise gentlemen of leisure to make themselves masters of the art—theoretically and practically—and they would then have a chance of becoming something more than "successful" operators, as had been facetiously observed, in alluding to the mass of photographers. If experimentalists, persons with leisure at their disposal might achieve considerable success, and confer a great boon upon their less fortunate brethren. There was much yet to be discovered and improved upon, and he did not think that there was a wider field than that open to amateur photographers, who should always remember that they were themselves greatly indebted to what might be called the "fathers of the art," for their liberality in giving their discoveries to the world. As regards the successful operators, there was a wide field for them too; and an amateur might think himself very fortunate if he could be classed with the successful operator. It was no easy thing to accomplish this; for though they might not make their own collodion (which Mr. Seely, the American, said was a capital receipt for spoiling a suit of clothes), and might not be so well up in the chemistry of the art as they might desire, great perseverance was required to become even an operator. It did not detract from the artist's talent, or make him less an artist, because he did not compound his own colours. For an operator to be appreciated, it was absolutely necessary that he should have good chemicals. It might be all very well for the photographic chemist or manufacturer of collodion, to say it would answer admirably; but he would rather prefer the opinion of a good operator as to its merits. He hoped they would pardon a little digression; but what was the distinction between photographer, or photographist, and operator he could not understand; but a distinction, he believed, was made. That the person who prepared the plate, sensitised, and developed it, was called the operator; and the person who exposed it, the photographer, and styled himself artist, was evidently a misnomer. His interpretation of artist did not apply to any photographer; for it was impossible to apply to that which was produced by a careful attention to certain chemical laws the same title as was given to the production of the hand and brain of a clever man. He merely alluded to this vexed question because he thought there ought to be no distinction in the term photographer, except as photographic chemist, apparatus-maker, experimentalist, and working photographer. If there was any claim to the title of artist from the exposing portion of the work, he thought all amateurs ought to claim it at once; for they had not only to expose, but excite, develop, and perform all the disagreeable adjuncts of plate-cleaning, &c. The amateur determined to produce good pictures, but without the time to experimentalise, when a holiday could be got, rambles away with the camera, looking out for Nature's most smiling features, and there was nothing that was likely to conduce so much to health and enjoyment. At such times it was astonishing how far you could walk, what a weight you could carry, and how much more you saw, than under ordinary circumstances. He would now offer a few remarks on what he considered the best method of practising photography by an amateur. Having well studied the art, apparatus and chemicals should be purchased of good quality to insure subsequent success; and though the results might soon begin to give satisfaction, he would advise a continued practice, in copying from objects of still life; for it was very difficult to get a good negative, and also very difficult at first to distinguish a good one when you had got it. The same remarks applied to prints, which also required practice; otherwise, when they had got a good negative, they would not know what to do to get the best print from it. Portraiture, which amateurs were very fond of indulging in when commencing, he would recommend to be deferred, for many reasons. In the first place, it was about the most difficult of all the photographic branches; it was open to, and received, the greatest amount of criticism; many more obstacles had to be met than in landscape photography; and it would tax their patience and ability to the utmost. It was this cause alone that had induced so many to give up the prosecution of the art, amateurs having commenced too early to portray their friends and acquaintances, and perhaps, what might be good-natured remarks of admiration at the first efforts, did as much mischief as anything; for flattering likenesses being unknown in photography, the poor amateur got flattered instead, and hence arose a fruitful source of trouble. His eyes were shut to his faults and errors; and if he, unfortunately, has no acquaintance or friend to help him over these pitfalls, he will get into difficulties, and possibly give up the pursuit. Again, the attempt to take a likeness by an amateur is generally attended at the outset with so many difficulties, that success was very doubtful. Unless he had a glass-house and plenty of time, which few amateurs possessed, he would have to find out the best position, arrange his background, and, if the operating room was far from the yard or garden, where he had placed his sitter, the necessary running backwards and forwards would not in any way compose his nerves or steady his hands. Nothing, perhaps, had been used for a fortnight or so. There was apparatus to dust, solution to mix, collodion to test as to exposure, glass to clean, measures and funnels to wash; and if anything went wrong (and it was a wonder if it did not), he got annoyed; and not having experience enough to imagine where the fault can be, he becomes perplexed, and ultimately satisfies himself with a very indifferent production. If a professional were asked to undertake the task under the circumstances, he would hesitate. All he could say to amateurs was, "Don't do it. If you feel yourself able to produce a good negative, make a rule of getting ready some hours before; and much waste of material and much annoyance will be spared you." He would recommend amateurs, as a rule, to confine their attention to landscape and architectural photography, either stereoscopic, or larger, as it pleased them. He would, however, prefer stereoscopic, as, in addition to the greater facilities with which the views could be taken, they were, as a rule, more attractive to friends; and, if desired, could be enlarged from, at leisure, for the portfolio. He would not enter into a controversy about the merits of the wet or dry processes, either as to results or convenience; but if they used the wet, they must make up their minds to carry a great deal more baggage, and put up with some additional expense in the way of assistance when out. If dry, they must work well and perseveringly at home, before they ventured to go far, to ascertain the right exposure, and to learn how to treat their plates under development; for a failure was not to be replaced but by going over the same ground again. Gentlemen practising, or thinking of practising, the dry processes, would do well to see the result arrived at by Messrs. Bourne, Mudd, and others, at the Society's exhibition this year. It had been said that a photographer should be able to produce pictures by any process; but to that idea he did not subscribe. Having satisfied themselves that the particular process they were about to follow would give good results, to command success they should follow that process, and no other, and not allow themselves to be led away by the promised results of others. From what had come under his own observation, the dry processes were much used by amateurs. This was not to be wondered at, as it was a process which admitted of being followed at leisure, and was readily available when an opportunity arrived. It was essentially the amateur's boon, and the greatest incentive to follow the pursuit. He, for one, thought that there would not be one-half the amateur photographers, if it were not for the dry process; and he did not doubt but that some manufacturers of photographic apparatus would bear him out in this assertion. He could not finish these remarks without drawing the attention of amateurs, who might regret want of time, to how much might be done for about four months in the year, by practising in early morning. From May till August, operations might be commenced by five o'clock in the morning;—indeed, in or near London it was much the best time, as the atmosphere was much clearer than in the middle of the day. Cleanliness was important. Using, as they did, vessels and apparatus at intervals, they were apt to forget what was last in them; and he would therefore advise them to make sure, by well washing before using them. Never make use of common for distilled water for developers, nor use solutions, &c., stale. Mr. Howard, in conclusion, said the subject admitted of a great deal being said upon it; and if what he had said only tended to elicit anything to the benefit of the members, it would give him great pleasure.

Mr. Howard illustrated his address by several beautiful views taken by the dry process.

The Chairman, with some complimentary remarks, moved a vote of thanks to Mr. Howard, which was warmly accorded.

The Secretary said, that he thought the glove had been thrown down to him by Mr. Howard, for he had always held that a photographer was an artist. He (the Secretary) saw some productions at the last Photographic Exhibition that were real pictures—not the mere result of chemical manipulation, but produced from the brain of an artist. He did not see why photographers should not claim that title.

Mr. Hannaford was of opinion that if a photographer was an artist, he stood a much better chance of producing good pictures than if he knew nothing of art. He feared any attempts to operate at five o'clock would fail, for at seven o'clock, even on a bright, fine morning, the light was very bad. In his experience he had found that common water answered every purpose of the photographer.

Mr. Howard argued that the use of rain or river water had a tendency to render the amateur slovenly in his operations.

Mr. T. Clark then read a paper recording several experiments he had made, upon which an animated discussion took place. The proceedings terminated.

Photographic Notes and Queries.

PHOTOMETERS.

Sir,—To be of any practical use to a photographer, a photometer should be available at a moment's notice, and portable, so as to be used in the studio or in the field; and as lenses, collodions, &c., vary so much, it would be better that each manipulator should be in a position to make his own, both easily and economically. This may be accomplished in the following manner:—Prepare a few sheets of paper by salting with

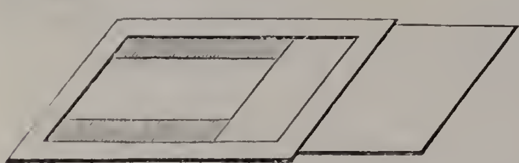
Bromide of potassium	...	$7\frac{1}{2}$ grains.
Common salt	...	$7\frac{1}{2}$,,
Water	...	1 ounce.

Dry, and keep for use.

Now sensitise on the following bath—

Nitrate of silver	...	20 grains.
Citric acid	...	$1\frac{1}{2}$,,
Water	...	1 ounce.

A small piece of the paper, say 4in. × 5in., and when dry, expose to sunshine for about two minutes, when it will assume a dark drab tint. As any process of fixing would alter the tone of the above, a piece of cardboard, say 3in. × $2\frac{1}{2}$in. must be coloured with water-colour to match this tint. This piece of cardboard is the photometer, and it is to be inclosed between two other cards, something in the manner of a dark slide of a camera, with a sliding front as in figure, and may, when the slide is closed, be carried in the waistcoat pocket.



Now sensitise another slip of the salted paper about 1in. narrower, and 2in. longer than the photometer, and when dry fold it round it lengthways, expose to sunshine till it exactly matches the tint, marking accurately the number of seconds occupied in doing so; then take a picture with your usual lens, collodion, &c., and with the same light, noting also the exact time. Should the exposure not be perfect, take one or two more pictures, till perfectly satisfactory; and having ascertained the exact number of seconds required for a perfect picture, we have only to note the proportion it bears to the time occupied in the exposure of the salted paper. Thus, if the paper took 2 minutes, or 120 seconds, to colour, and the collodion 30 seconds to take a picture, we have a constant gauge of one-fourth, which may be marked on the back of the photometer as a memorandum.

To use the above we have only to sensitise a slip of the paper. Dry, fold round the photometer, which is slipped into the case, and the slide shut. Upon arriving at the spot where our picture is to be taken, withdraw the slide a short distance, say half an inch, and note the time taken to colour the paper, and close up again; divide that time by 4, and you have the time required for the exposure of your picture. This operation may be repeated several times during the day by withdrawing the slide a little further each time.

Although many words have been used for explanation, the whole will be found both simple and easy to arrange. Boisen.

[Our correspondent's suggestion is ingenious, but the plan may be much simplified; it is only necessary to watch the gradual change of a piece of sensitised paper until it has assumed the depth of tone previous experiment has shown to be sufficient. We shall describe the photometer used in the Ordnance Survey Office in an early number.]

POSITIVE PRINTING.

Sir,—There seems to be much discrepancy in the various formulæ recommended for printing positives; they cannot all be right; and if the researches of MM. Davanne and Girard are worth anything, some of these formulæ must be very wrong. You would confer a favour on many photographers if you will indicate briefly the best method for toning and fixing that, with the light we at present have upon the matter, may be employed.

Alpha.

PRINTING ENLARGED POSITIVES.

Sir,—Will you kindly allow me to ask, through the medium of the "News," whether any of your subscribers undertake printing enlarged positive proofs from small negatives by the solar camera, or otherwise? I think many amateurs would be glad to avail themselves of such an opportunity. E. S. C.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Tuesday,	April 24	—Birmingham Photographic Society.
Wednesday,	,, 25	—North London Photographic Society.
Friday,	,, 27	—Photographic Society of Ireland.
Tuesday,	May 1	—London Photographic Society at King's College.
Wednesday,	,, 2	—Manchester Photographic Society.
Thursday,	,, 3	—Glasgow Photographic Society.
Thursday,	,, 3	—Belfast Photographic Society.
Friday,	,, 5	—Norwich Photographic Society.
Tuesday,	,, 8	—Photographic Society of Scotland.
Wednesday,	,, 9	—Chorlton Photographic Society.

TO CORRESPONDENTS.

*** In consequence of the length of our reports of the recent meetings, several articles are postponed. Mr. Hardwich's paper "On the Manufacture of Collodion" will be concluded next week. The "Photographic Trip up the Vale of Neath" (continuation), and the "Amateur Mechanic," are in type.

*** We have received a letter from Messrs. A. Marion and Co., calling attention to an error in our report of the last meeting of the Photographic Society of London. The communication read to the meeting relative to the successful exposure of a plate sensitised last August, was received from Messrs. Marion and Co., in one of whose "patent preservative cases" the plate had been kept, and not from Messrs. Murray and Heath, as stated in our report. If Messrs. Marion and Co. will refer to our impression of last week, they will observe that the error has been already corrected.

H. A. J.—1. With a ¼ inch stop, your caloscopic lens ought to give tolerably straight marginal lines. You will not be able to take stereo. views with it, except of very distant objects. The size of the image depends upon the distance of the object from the lens. 2. The advantage to be gained depends entirely upon the object you have in view. The lens must be adapted for the work required of it; you cannot make one lens answer for everything. 3. The proper distance is just what the maker chooses to adopt; it varies from $2\frac{1}{2}$ inches to 6, 8, or 10 inches. 4. The size of the picture on the focussing-glass is about two-thirds the focal length of the lens, consequently, you can only get a very small landscape with a portrait lens of short focus.

A Beginner.—Make your toning bath with chloride of gold, 15 grains; chloride of lime, 15 grains; common salt, 15 grains. Dissolve each of the above separately in 1 ounce of water, and add 1 drachm of each solution to 8 ounces of water. The proofs tone slowly; but the toning may be prolonged half an hour more or less, until the desired tint is obtained; then fix in solution of hypo., two ounces to the pint, frequently replenished with crystals of hypo.

J. P. G.—1. White lac varnish applied with a soft, flat varnishing brush. Alcohol 6 ounces, white lac 3 drachms, gum-sandarac 2 drachms; put the bottle containing these ingredients in a warm place, shaking occasionally; when dissolved, filter through a piece of flannel previously moistened with alcohol. 2. You can copy the positive on a dry plate by placing them in close contact, and exposing to day-light for a few seconds, according to intensity of light.

Optic.—The rule is: as the image is to the object, so is the distance to the focus of the lens; therefore, if you require an image 4 inches, one-fourth the size of the object (20 inches), and have a lens of 12 inches focus, the object must be placed about 5 feet in front of the lens; the focus will then be nearly 14 inches. Example: As 4 : 20 : : 12 : 48 + 12 = 60 inches.

Effingham.—So much depends upon tact and skill, that any process will succeed or fail, according to the capacity of the operator; choose the simplest. If you burn a candle in the room, screen its light by yellow glass or paper.

Fanny.—It is better, of course, to keep the photographs protected from the atmosphere. The only portfolio that accomplishes this, is the one patented by Mr. Harvey; the variety termed the *Golfo* allows of one photograph being seen through glass.

F. D.—1. The process of photozincography is fully described in No. 79 of the "Photographic News." 2. It is no more trouble to calculate *parts* than *specific weights*. A small operator may prefer to take grains or drachms, while a large one will take ounces or pounds.

T. T. W.—1. We have not tried the transfer paper you refer to. 2. You must have a lens for each portrait, fixed in the front of the camera. 3. The formula you require was given in the last number of the "News."

A Tyro must not expect to succeed in "Instantaneous photography," which requires a complete mastery over manipulation derived from long experience.

An Old Bath.—Methylated spirits, if good, will answer your purpose. You will not be able to obtain correct life-size portraits with a small lens; nor make a good camera, unless you are clever at cabinet making.

W. H. H.—The *reason* is, that the cyanide acts chemically upon the cement, for which there is no remedy. The *cure* is, not to leave your dipper in it, for there can be no compulsion to do so.

Bart.—It would be necessary first to know the strength of the solution before we can pronounce upon its capacity.

Sel d'Or.—You can buy the double chloride of gold and sodium at some of the dealers in photographic chemicals.

Argent.—Pure metallic silver is worth about 5s. 2d. per ounce. Two ounces of nitrate of silver contain about $1\frac{1}{4}$ ounces of pure silver.

Isis.—The remedy is to add a little alcohol to the developing solution; it wil counteract the greasiness you complain of.

An Artist.—1. You had better write to the patentee. 2. You can practice the art, and sell your productions without prejudice.

Oscar.—You should allow the collodion to settle for at least twenty-four hours before using, and decant it without disturbing the deposit.

Old Ford.—An exaggerated stereoscopic effect is not at all desirable. You will obtain sufficient relief with your twin lens camera.

W. H.—Your print was floated in a too weak silver solution, and it also appears to have been too long in the fixing bath.

Communications Received:—J. F. T.—A. W. G.—Gwenllian.—J. B.—T. P. Bath.—L.—Omicron.—D. S. R.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard, London, E.C.

THE PHOTOGRAPHIC NEWS.

Vol. III., No. 86.—April 27, 1860.

ON THE CAUSES OF FADING IN POSITIVE PROOFS.*

(C.) If a great number of proofs are successively immersed in the fixing solution, after a certain lapse of time, magnificent tints are obtained upon them; but, on the other hand, an abundant deposit of sulphide of silver is formed. It is supposed by some writers, that upon the addition of fresh crystals of hypo. this sulphide is dissolved, and that we must never filter the solution, but this is a grave error. Sulphide of silver is quite insoluble in hyposulphite of soda.

We will now examine the alterations the bath undergoes. We have seen, that every time a proof is immersed in the fixing solution, a double hyposulphite of soda and silver is formed, and a little sulphite of soda. Now, if we add a solution of nitrate of silver to a fresh solution of hyposulphite of soda, the same products are formed; and yet we may remark that such a bath does not give as good tints as an old bath. What is the cause of this difference?

It is not difficult to determine it, although the reactions are not so simple as they appear at first sight. In the first place, we observe that hyposulphite of silver is a very stable salt so long as it finds itself in presence of a great excess of hyposulphite of soda; but *if the solution of this salt is weak*, or rather, *if, in consequence of the successive immersion of a great number of proofs*, the quantity of this salt is diminished, the silver compound separates from the hyposulphite of soda, with which it formed a double salt, and is then decomposed into *sulphide of silver* and *sulphuric acid*.

$$\underbrace{AgO,S_2O_2}_{\text{Hyposulphite of silver.}} = \underbrace{AgS}_{\text{Sulphide of silver.}} + \underbrace{SO_3}_{\text{Sulphuric acid.}}$$

But the sulphuric acid being extremely energetic, it is never found free in hyposulphite of soda, as it immediately decomposes the latter, unites with the base, and eliminates hyposulphurous acid.

$$\underbrace{NaO,S_2O_2}_{\text{Hyposulphite of soda.}} + \underbrace{SO_3}_{\text{Sulphuric acid.}} = \underbrace{NaO,SO_3}_{\text{Sulphate of soda.}} + \underbrace{S_2O_2}_{\text{Hyposulphurous acid.}}$$

In this state the solution possesses an acid reaction to litmus paper. We have produced this state artificially in a new bath of hyposulphite of soda, and satisfied ourselves of two phenomena, which it is important not to overlook.

1. That the hyposulphurous acid is not immediately decomposed.

2. That this acid produces a very beautiful colouring on the proofs, from whence it results that the acid character of the fixing bath, which, at first sight, appears very singular, since we know that the hyposulphites are decomposed in presence of acids, is, nevertheless, due only to a very simple reaction, which may be produced easily.

Still we may observe that little by little the hyposulphurous acid is decomposed into sulphurous acid and sulphur,

$$\underbrace{S_2O_2}_{\text{Hyposulphurous acid.}} = \underbrace{SO_2}_{\text{Sulphurous acid.}} + \underbrace{S}_{\text{Sulphur.}}$$

and it is just when this decomposition is established that the toning is produced in a decided manner.

This decomposition also takes place even in the substance of the paper where hyposulphite of soda is imbibed; hence it results that the sulphur is deposited upon the blacks of the proof, and that the latter, although presenting an agreeable appearance, contain sulphur besides the sulphide which in part constitutes the image.

Thus we arrive at the same result, by immersing a great number of proofs in a concentrated solution of hyposulphite of soda, as by the prolonged immersion of a proof in a new bath.

(D.) Still we perceive that not only the sulphur has been precipitated, but that also sulphurous acid remains in presence of hyposulphite of soda. Now, we know that these two substances cannot remain together without forming new products; these products are—trithionate of soda and tetrathionate of soda.

$$2(\underbrace{NaO,S_2O_2}_{\text{Hyposulphite of soda.}}) + \underbrace{3SO_2}_{\text{Sulphurous acid.}} = \underbrace{NaO,S_3O_5}_{\text{Trithionate of soda.}} + \underbrace{NaO,S_4O_5}_{\text{Tetrathionate of soda.}}$$

Thus, when we leave at rest a solution of hyposulphite of soda, through which a current of sulphurous acid is passed, we have the two products which give the beautiful tones to the proofs which we know such a solution will produce.

(E.) It now remains to examine which of these two salts is the most favourable to the production of this colouring.

To make the experiment, take two fresh solutions of hyposulphite of soda, add to one trithionate of soda, and to the other the tetrathionate. The proof, when taken out of the printing frame, is carefully washed, and cut into two portions, which are submitted to the action of the baths.

The bath containing trithionate of soda gives to the proof a yellow tone; if this bath is allowed to act for an hour, sulphur is deposited.

The bath containing tetrathionate, on the contrary, gives, in less than from 10 to 20 minutes, the violet tone peculiar to salts of gold; if the proof remains too long in the bath, it is sulphurised.

A proof, after being immersed for ten minutes in this bath, gave, upon analysis, the following weights of chlorine, sulphur, and silver:—

Chlorine	7.5	to	4	
Sulphur	18	to	0·5	*traces.*
Pure Silver	611	to	620	
	636·5	to	624·5	

Thus, whenever tetrathionate of soda, being united to the hyposulphite of the same base, acts too long upon the proof, a deposit of sulphur is produced upon the latter.

Now, we can produce this tetrathionate of soda in various ways, either in preparing it separately, or in developing it in the bath of hyposulphite of soda by a persalt of iron, copper, or gold. We give the preference to a bath prepared with perchloride of iron, but it is essential that this perchloride be quite neutral, else a rapid decomposition will be set up in the bath.

We can also tone the proofs in a pure solution of tetrathionate of soda, prepared in the following manner:—

Dissolve iodine in hyposulphite of soda until a brown colour is produced; then add nitrate of lead until the yellow precipitate is no longer produced. The filtered liquor is tetrathionate of soda.

Nevertheless, we must observe that this preparation is very difficult, for the iodide of lead is soluble in this substance, at least, upon adding an excess of the salt of lead. But in this case, also, the effect is injurious, the presence of the salts of lead being dangerous in the fixing baths.

* Continued from vol. iii. p. 392.

On the other hand, if the iodide of lead, or any iodide whatever, is found in the bath, the whites of the proof assume a very disagreeable yellow colour. Therefore, in fixing positives, we must never make use of a solution of hypo. which has been employed for fixing negatives containing iodide of silver.

(F.) We have also to explain another reaction which sometimes manifests itself in fixing baths. We have had much difficulty in following the various decompositions about to be enumerated; still, we may venture to affirm that, if they are not quite exact, the results have been at least observed with accuracy.

Having immersed, in a bath of hyposulphite of soda, a great number of proofs darkened in the light, and washed in distilled water, we observed an abundant deposit of sulphur produced in less than an hour. Now, this result appears to be due to the formation of hydrochloric acid in the texture of the paper. The hydrochloric acid instantly produces a disturbance in the solution: chloride of sodium and sulphur being formed.

The formula corresponds, it is true, to that we have already given, since, in fact, the chlorine always passes to the state of chloride of sodium, but, in a rapid reaction, the chlorine combines with a portion of the hydrogen of the water, and forms a precipitate of sulphur.

We cannot otherwise explain this production of sulphur, almost instantaneous, when we immerse an excess of paper covered with sub-chloride of silver in a solution of hyposulphite of soda.

Besides, if there is or is not a formation of hydrochloric acid, the result is striking. Thus, there is still another cause of the production of sulphur which must be noted.

(To be continued.)

MR. HARDWICH ON THE MANUFACTURE OF PHOTOGRAPHIC COLLODION.*

OBSERVATIONS ON THE PRECEDING FORMULA.

The distinctive peculiarity of the collodion now described is in the pyroxyline, which, by a proper adjustment of the proportions of the two constituents of the nitrosulphuric acid, acquires peculiar properties. These I need not now describe, seeing that they are sufficiently referred to in the Report of the Collodion Committee; suffice it to say that, by using the sulphuric acid much in excess of the nitric, great transparency and toughness of the film are secured, with a fine surface-texture, which gives sharp definition. At the same time a quality of image is obtained corresponding closely with that produced by an organic material—like gum arabic—applied to the surface of the film, and possessing a fine ruby-red colour when taken in a moderately good light.

With regard to the temperature at which the pyroxyline should be made, I worked at first at 140° F.; but at the commencement of last spring was induced to raise it ten degrees, in consequence of representations that the collodion was somewhat deficient in fluidity. This increase of temperature, however, assists in generating traces of a body (probably nitroglucose) which causes the collodion to lose its sensitiveness more rapidly after iodising.

Some, perhaps, will not be prepared to believe that a sensitive pyroxyline can be made at so high a temperature as 150° F.; and, with nitrosulphuric acid of the ordinary composition, this would indeed be difficult. When, however, the proportion of nitric acid is greatly reduced, I do not find that the sensitiveness is so much affected by the temperature of the acids.

The proportions of ether and alcohol in the collodion—half-and-half—will, I think, be found to be those best adapted for general purposes. With less alcohol the film is more contractile, and more prone to dry up after sensitising. With a larger proportion of alcohol—say two parts of alcohol of ·805 at 60° to one of ether of ·725—the sensitiveness is impaired. A friend—whose judgment is quite to be relied on—has used more than two gallons of my collodion prepared with excess of alcohol; and he assures me that it is remarkably well adapted for coating large plates, and is sufficiently sensitive for copying works of art and for landscapes; nevertheless, I do not recommend this formula in preference to the other for a normal collodion, seeing that we have no means of increasing sensitiveness when it proves deficient.

I have tried the effect of varying the strength of the alcohol from sp. gr. ·805 to ·820. When the ether and alcohol in the collodion are used in equal parts, the latter must not be in what is termed the absolute state (sp. gr. ·805), or the film will be more or less impervious to liquids—like gutta-percha—if the particular pyroxyline which I advise be adopted. With alcohol not stronger than ·820, the collodion works well at first, but becomes rather thick and non-adherent towards the bottom of the bottle. I therefore take an intermediate strength, by using alcohol of ·805 for the plain collodion, and alcohol of ·817 for the iodiser.

The quantity of iodide of potassium in collodion made by this formula ought not greatly to exceed 3½ grains to the ounce, or there will be peculiar markings on the surface of the iodide of silver at the lower corner of the excited plate. The purer the pyroxyline, the greater the chance of the iodide being in excess; but, nevertheless, if the above-mentioned quantity should produce a film more opalescent than the operator desires, it will be in his power to give additional creaminess by introducing a little iodide of cadmium without any danger of the iodide bursting out upon the surface and producing the marks before described.

In the Report of the Collodion Committee recently published, I think that an erroneous impression is conveyed as to the length of time this collodion will keep after iodising, which may have resulted from several members of the Committee having worked in a bad light. Certainly there are some varieties of pyroxyline which displace iodine from iodide of potassium less rapidly than the pyroxyline which I advise; but there are others which do so more rapidly, and hence the position of the collodion as regards keeping properties is intermediate. It is also in our power to increase the stability, by using the mixed iodides of potassium and cadmium instead of the iodide of potassium only, after which the collodion will retain a fair share of sensitiveness for many weeks.

The cadmium iodiser has not the marked effect in glutenising this collodion which it is known to exercise with some other kinds; and when the nitrosulphuric acid is used at the weakest point possible, the resulting collodion, iodised with cadmium, will be quite manageable even on glasses of considerable size.

White spots have been spoken of in connection with the potassium iodiser. My experience leads me to believe that they do not depend upon any insoluble particles, but are due to specks of dust adhering to the film. I find the same spots oftentimes in collodion containing only iodide of cadmium; and since the mixture of ether and alcohol given in the formula is capable of dissolving 4 grains of iodide of potassium to the ounce, it is not easy to understand how there can be any insoluble particles, when only 3½ grains are employed.

In proposing the pyroxyline mentioned in this paper as a good commercial form, I would call attention to the tenacity with which it adheres to the glass: it has been pointed out to me that the collodion, after keeping for a time in the iodised state, is well fitted for use in Taupenot's process, and does not show any disposition to rise in blisters beneath the albumen.

The principal fault which I found in this collodion during the last summer was the occasional occurrence of fine black lines, showing on the finished picture in the direction of the dip. They are most abundant when the pyroxyline is made

* Concluded from vol. iii. p. 382.

in rather concentrated acids; and by increasing the quantity of water in the nitrosulphuric acid, are nearly removed. Much may therefore be expected from the use of potash as a cleansing agent to the cotton, since a weaker nitrosulphuric acid can then be employed without causing solution of the fibre.

The foregoing paper is incomplete in one point—viz., in not describing the effect of leaving the cotton in the nitrosulphuric acid for a longer or shorter time. My experience has been, that a short immersion gives a product at least 15 per cent. heavier, but dissolving in the ether and alcohol with a larger amount of sediment, and yielding a slightly less limpid collodion.

COLLODION POSITIVES.

It is not surprising that direct positives enjoy such extensive popularity, seeing that they are obtained with so much facility, are very pleasing in effect, and produced at a minimum cost. Various methods of obtaining them are in vogue, but it is doubtful whether many are quite satisfactory. The following process gives as good results as are obtainable by any we have tried, and better than most:—

The Collodion.—As the image is formed on the surface of the collodion film, it is useless to employ solutions as strong as those for negatives. A negative is generally veiled, so that if examined by reflected light, no details can be perceived in the whites: this is caused solely by the thickness of the layer of iodide of silver. Consequently, to obtain a good positive picture, the quantity of iodide must be such that the image will present, by *reflected* light, all the details that a negative shows by *transmitted* light.

Generally, the bromides give veiled proofs, unless employed in very minute quantities, and with a silver bath containing no nitrate. The addition of bromides to positive collodion does not appear to be necessary; for the slightest details of a picture on collodion show very well by reflection, without exhibiting the slightest intensity by transmitted light.

The proportion of ether to alcohol must be such that the film adheres very firmly to the glass, and yet flows freely.

The proportion of pyroxyline to iodide must be such that the layer is extremely thin, and still possesses sufficient tenacity to retain the iodide of silver formed in the silver bath.

The collodion must be quite colourless, that is to say, quite neutral, in order to keep good a sufficient length of time, and to insure rapidity.

The iodides of cadmium, potassium, and ammonium, yield good results when employed *alone* in collodion. Cadmium appears to be best for keeping; in cold weather, that is, when the temperature is below 60°, the collodion should be prepared in the following proportions:—

Ether	25 ounces.
Alcohol	10 ,,
Pyroxyline	50 to 80 grains.

When the temperature is 60° and above—

Ether	20 ounces.
Alcohol	10 ,,
Pyroxyline	45 to 80 grains.

Sensitise either of the above with the following:—

Alcohol	2 ounces.
Iodide of cadmium	90 grains.

Add 20 minims of this to each ounce of plain collodion.

It is of the utmost importance that the glass employed be perfectly clean, as the slightest impurity becomes visible, and spoils the picture.

Sensitising.—Fused nitrate of silver must be avoided, as it generally yields fogged pictures, owing, doubtless, to the presence of nitrite of silver.

The silver solution is composed of—

Distilled water	20 ounces.
Crystallised nitrate of silver	1 ounce.

Add a few drops of the alcoholic solution of iodide of cadmium, shake well together until the nitrate is dissolved; then set it aside for 24 hours. The iodide of silver formed is dissolved in the nitrate. Filter before using every day.

The addition of alcohol is advantageous, inasmuch as it facilitates the flow of the developing solution.

In summer, when failures in this process most frequently occur, it is advisable to add to the bath one drachm of acetate of ammonia, soda, or potassa, dissolved in a little water. It forms crystals of acetate of silver in the bath, and, twenty-four hours after contact, the bath is filtered for use. The acetate of silver is kept on the filter, and the bath passed through it every day, upon concluding operations, to keep it saturated with acetate of silver. Both filter and bath must be kept from daylight. The object of this addition is to neutralise the effect of the free nitric acid, which seizes upon the silver by driving off the acetic acid. Now, the effects of the latter are much less to be feared than those of nitric acid, which greatly retard the action of light.

Exposure.—The exposure is about one-fourth employed for negatives; other circumstances remaining the same.

Development.—Sulphate of iron being more energetic in its action than pyrogallic acid, it is preferred for developing positives. The following formula is most commonly employed:—

Saturated solution of sulphate of iron, filtered	10 ounces.
Beaufoy's acetic acid	1 ounce,
or, citric acid	$\frac{1}{2}$,,
Nitrate of silver	$1\frac{1}{2}$ drachms.
Nitric acid	20 minims.

When mixed, it is advantageous to bring the mixture to the boiling point, and allow it to settle for a couple of days.

The acetic acid is added to prevent the developer fogging the picture, and the nitric acid to form a binoxide of nitrogen in the bath, which renders a new bath as good as an old one.

Sometimes the nitric acid is replaced by nitrate of potassa, and purer whites and a more brilliant and metallic picture is obtained. Dissolve 1oz. of nitrate of potassa in 4oz. of water; when dissolved, add $1\frac{1}{4}$drm. of nitrate of silver. Then add to the solution 40gr. of iodide of potassium; a precipitate of iodide of silver is formed. The vessel containing the solution is exposed to the sun for a few seconds, and then the whole is thrown into 14oz. of the acetic solution of sulphate of iron. It is the better for being boiled during two or three minutes previous to being used for the first time, and then left to repose for twenty-four hours.

The solution is poured into a porcelain dish and filtered after use each time. The plate, collodion side downwards, is quickly immersed in it, and kept there for a few seconds. The picture appears immediately; and, although it looks weak when viewed by transmitted light, it greatly improves when fixed.

The picture must not be exposed to the light long before it is fixed, else it will become fogged. We may recognise if the exposure has been too long, by the proof being veiled, and if the whites show details by transmitted light, which are not visible by reflected light. If, in reducing the time of exposure, the whites do not exhibit the details by *reflected* light, it is an indication that the collodion contains too much iodide. The exposure has been too short if the parts of the object strongly lighted alone appear, without the darker parts.

This bath may be diluted with twice or thrice its bulk of water; in that case, it is better to pour the developer on the glass plate, as with pyrogallic acid. In this way the spots that sometimes appear in the other method are avoided.

The black deposit, formed in the developing bath, must not be thrown away, as it consists of nitrate of silver; it should be collected on the filter. If, after long use, the bath fogs the proofs, a small quantity of acetic acid must be added to it. Fix with weak solution of cyanide of potassium.

After fixing, the proof must be carefully washed and dried, then varnished with a transparent varnish, and afterwards with a black varnish.

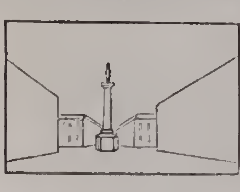
We have not given all the minutiæ of manipulation, as they have been so frequently given before; our object has been merely to show the *rationale* of a good positive process. It will, doubtless, admit of many modifications, but it is assumed that if it be fairly tried, it will answer the usual requirements of the photographer.

ON COMPOSITION AND CHIAR-OSCURO.—XI.

BY MR. LAKE PRICE.

"Say what is Taste, but the internal powers
Active and strong, and feelingly alive
To each fine impulse?—a discerning sense
Of decent and sublime, with quick disgust
From things deform'd, or disarranged, or gross
In species?"—Akenside.

The immense variety presented by landscape subjects, precludes principles being illustrated to meet every combination; sometimes it is a forest scene, anon a gorge in an Alpine pass, then a view over distant country, &c. &c., which forms the *motif*, but in each and every one of the subjects which abundant Nature offers to our choice, the representation must be within the general rules of composition. Sometimes the whole material of the picture, instead of being balanced *per se*, and, therefore, composing properly, as a view in a city, *a*, or up a

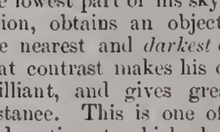


a

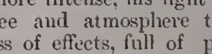
b

valley, *b*, will, of necessity, be accumulated on one of its sides; and of course, if allowed so to remain, the effect would be most disagreeable; but the addition of a *foreground* object, sufficiently powerful in its depth, although of small bulk, at once restores the equipoise of the composition, *c*. Thus, a group of figures, a boat, a rock, a tree stump, &c., might effect this end, according to the nature of the subject; indeed, in many masters, this seems a favourite mode of arrangement.

"A View of Dort," by Cuyp, is composed on this principle. The *intention* of direction is clearly indicated by the oar, yard, sails, and cloud; the horizontals being given by the water, the perpendiculars by the spire and masts, the opposing lines are seen in the boats and rigging. The advantages of this composition consist in its extreme breadth and simplicity; the balance of the subject, disturbed by the mass of the town, &c., on the left, being at once restored by the boat and figures, which, though



c



d

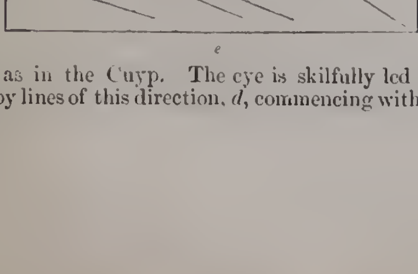
small in comparative bulk, are vigorous in depth. The effect being sunset, his favourite theme, and the *highest light* in the lowest part of his sky, the painter, by his lineal composition, obtains an object (in the boat) which shall bring the nearest and *darkest* object in contrast with it, and by that contrast makes his darks more intense, his light more brilliant, and gives great space and atmosphere to his distance. This is one of a class of effects, full of poetry and sentiment, which photographers never seem to portray; here in the *flat* tints of mere atmospheric gradation there is little or no detail, and extreme "sharpness" would but falsify the hazy effect of sun-light. In *Art* we have seen, in the "Mouth of the Humber," how

trifling a subject may, with sky, sea, and accessories, be worked up into a grand composition. The flat, insignificant distance of that picture would seem to promise little to him who saw it under a common-place effect, and with a common-place eye; but in landscape photography such subjects are the last to be undertaken. We must always select those which offer a considerable amount of material for delineation by the lens. As photography progresses we shall doubtless see brilliant *effects of sun-light* rendered in the foreground shadows. There is great unity in all the lines of the composition, many of which are almost as regular, *e*, as those of the Turner, given in No. IX., and, indeed, in the main, have some resemblance to them.

The catching lights on the group of figures should be appreciated, which relieve them from the further landscape, and, by their vigour, give atmosphere and distance beyond, being *the first impulse* to the subsequent lines of the composition.

landscape with more power, the great error now being that the mass of photographers do not aim at them. The parrot cry of "sharp, sharp," which the ignorant in art raise, seems the main point aimed at, the result being, in the majority of cases, the production of painfully elaborated details, instead of broad *effects* of light glancing through the landscape, which are qualities of an infinitely higher standard, and which, when produced, are sure to supersede the other in the estimation of the spectator.

In this subject, by Both, we see another treatment of a landscape on the diagonal line, varying, however, from the Cuyp, inasmuch as here the painter has concentrated his principal vigour in the *centre* of the composition, and not at



e

the side, as in the Cuyp. The eye is skilfully led into the picture by lines of this direction, *d*, commencing with the long

"As the small pebble stirs the peaceful lake,
The centre mov'd, a circle straight succeeds
Another still, and still another spreads."—Pope.

Both, surnamed *d'Italie*, from his long residence and study in that country, is a fine landscape painter, much attached to *vigorous effects of sun-light*, which he renders with great truth and elegance. Opportunity serving, he is one of those masters whose works the student should carefully analyse.

If the student has a real love for his art, and desires to arrive at excellence in it, *continued* observation and study of Nature are requisite. We are told that Hogarth even sketched on his finger-nails expressions and faces which struck him; and the writer was himself witness of the close investigation which makes the study of Nature a labour of love to the real artist. Some years since, on the Lake of Como, he happened to be on the same steamer with the great poet of the pencil, Turner, and thus had an opportunity, of which very few can boast, of seeing him sketching or painting. Turner held in his hand a tiny book, some two or three inches square, in which he continuously and rapidly noted down one after the other of the *changing* combinations of mountain, water, trees, &c., which appeared on the passage, until some *twenty* or more had been stored away in an hour-and-a-half's passage. This example of so consummate an artist shows the engrossing love of the pursuit, with which excellence in it must always be accompanied.

(*The articles on* Chiar-Oscuro *will commence in our next impression.*)

Dictionary of Photography.

Nitrate of Potassa.—*Nitre, Saltpetre.* This salt is sometimes met with ready formed by nature. It may be prepared directly by combining nitric acid with potassa, or by decomposing carbonate of potassa by the same acid. It forms prismatic crystals, which consist of one equivalent of nitric acid, combined with one equivalent of oxide of potassium, or potassa. Its solubility in water increases greatly with increase of temperature; at 64°, water dissolves 29 per cent., while at 207°, 236 parts dissolve in 100 parts of water. Nitrate of potassa is a very powerful oxidising agent, and readily yields nitric acid by decomposition with sulphuric acid. For this reason, it is employed in the preparation of gun cotton. It is also employed to obtain nitrate of iron, for positive developing agents. Nitrate of potassa, like nitrate of ammonia, is produced in the silver bath by double decomposition, when iodide and bromide of potassium are used as sensitising agents in collodion.

Nitrate of Silver.—One of the most important agents in photography. It consists of nitric acid in combination with oxide of silver, one equivalent of each, crystallising in large, flat, six-sided plates. *Lunar caustic* is nitrate of silver fused and cast into moulds. Nitrate of silver dissolves in its own weight of water at 60°; it is insoluble in alcohol. Its neutrality may be tested by litmus paper. It is sometimes adulterated with potassa or with copper: the presence of the latter may be ascertained by the addition of a few drops of solution of ammonia. The solution of this salt is quite colourless, and is not affected by light, unless organic matter be present. It exercises a corrosive action upon animal matters. It is decomposed by iron, zinc, and mercury, which precipitate the silver in the metallic state. By double decomposition, nitrate of silver furnishes iodide and chloride of silver salts, which possess photogenic properties in an eminent degree.

Nitrate of Silver Bath.—The solutions of nitrate of silver employed for exciting positive paper, and for sensiting collodion plates, are termed "nitrate-baths;" the formulæ for which have been given in these pages, and may be found in all treatises on photography.

(*To be continued.*)

Correspondence.

FOREIGN SCIENCE.

(*From our Special Correspondent.*)

Paris, 23rd April, 1860.

As the fixing and chemical decomposition of positive proofs appears now more than ever to be the order of the day, I shall give you some remarks by M. Gaumé, which are not, perhaps, entirely devoid of value. It is with much truth, according to this author, that sulphur is accused of being the chief cause of spoiling or fading positives, and that is why photographers have been constantly recommended to wash their proofs well with water before fixing them, to employ invariably hyposulphite which is not too old, and to wash again with great care. Besides this, the use of chloride of gold for toning has a certain advantage; for if, in spite of every possible care, a proof is found to be sulphurated, it may have its purity of tone restored by the chloride. But M. Gaumé takes another, and perhaps more important, precaution; he renders his paper impermeable, so that the hyposulphite of soda cannot penetrate into its pores. This is effected by impregnating it with gutta percha, by means of a solution of this substance in benzine, and suspending it by one of its corners to allow it to dry. When the paper is quite dry, he places it before a good fire. The gutta percha which was first deposited in a pulverulent state now melts and forms a kind of internal varnish, which is almost impermeable. The paper is then albumenised with 100 parts of albumen, 25 of rain water, and a solution of common salt at 15°; after drying, it is sensitised with nitrate of silver, and the other operations are as usual. It appears that this kind of positive paper, when well prepared, unites the advantages of the glass-plate with those of paper.

Professor Erdmann, of Leipzic, having expressed the opinion that when cellulose is acted upon by Schweitzer's ammoniacal solution of oxide of copper, it is simply disintegrated, like starch in boiling water, M. Schweitzer has lately brought forward the following facts, which, he thinks, sufficiently prove that the cellulose is really dissolved:—

1st. Under the microscope, the fibres are seen to disappear completely, when the ammoniacal reagent touches them.

2nd. When the dissolved cellulose is thrown down, it does not show a vestige of organised structure.

3rd. The solution may be filtered, and obtained in a limpid and diluted state.

4th. This solution of cotton may be made to pass through vegetable cellular tissue.

The fact which M. Erdmann based his argument upon was, that the cellulose is precipitated spontaneously from the ammoniacal liquid, when this liquid, after being diluted with water, is left to itself for eight or ten days in a well-stoppered bottle. To which M. Schweitzer replies, that the dissolving power of ammoniacal solution of copper is modified by the addition of water. He asserts to have observed himself, that this solution, when left to itself for some time, loses its dissolving power altogether. Finally, when a solution of oxide of copper in ammonia is diluted with much water, the oxide of copper may be precipitated as *hydrate* of oxide. The precipitation of cellulose, under the same circumstances, ought not, therefore, to surprise us.

These remarks will be valuable, if ever the ammoniacal solution of cellulose becomes as widely employed in photography as collodion or albumen.

M. Peters, the well-known editor of the *Astronomische Nachrichten*, has announced that he will publish in the next number of his journal a memoir by M. Liais (whose name I mentioned lately in reference to a new comet). In this memoir, the author will show that the discovery of the new planet by M. Lescarbault, although verified by M. Leverrier, is a complete delusion! I am myself inclined to believe, however, in the existence of the new planet, which has been called Vulcan; it should not, however, have been christened until it had been seen a second time.

M. F. Margueritte has just communicated to the Academy of Sciences a process for manufacturing sulphate of soda, or sulphate of potash, by means of the sulphuric acid contained in gypsum. The following will give you an idea of the process in question for the preparation of sulphate of soda (for sulphate of potash, chloride of potassium is used):—

A mixture, containing equal equivalents of chloride of sodium and sulphate of lead, is calcined at a red heat. The mass easily fuses, and thick vapours of chloride of lead are given off and distill. When the operation is terminated, we have sulphate of soda and chloride of lead, the latter having been separated by distillation. The melting mass is then poured out, and, on being treated with water, sulphate of soda is dissolved and separated from a certain quantity of sulphate of lead non-decomposed, and which is used in the next operation. The soda solution is then crystallised. The chloride of lead, condensed in a proper recipient, is mixed with water containing sulphate of lime (gypsum) in suspension, or with sea-water, which contains sulphate of lime, sulphate of magnesia, sulphate of potash, and soda. In both cases the chloride of lead is thus transformed again into insoluble sulphate of lead, which is precipitated, and serves for the next operation. There is, you see, a complete rotation. Instead of water charged with gypsum, solutions of sulphate of iron, or sulphate of alumina, &c., may be employed. The principal precaution to be observed in this ingenious pro-

cess, is to effect the regeneration of the sulphate of lead in well-diluted liquors.

M. Poey, director of the Observatory of Havana, addresses to the Academy a note upon lightning without thunder. The finest work upon thunder and lightning is, doubtless, Arago's "*Notice sur le Tonnerre.*" It contains, however, no explanation of that remarkable, though familiar, phenomenon, called "sheet lightning," which is not accompanied by thunder. The production of this kind of lightning remained a mystery until Dr. Phipson published, in 1857, his paper, "*Sur quelques phenomènes météorologiques observées sur le littoral de la Flandre occidentale,*" in which it is shown that sheet lightning is produced when the electrical discharge occurs between masses of clouds which are in close proximity to each other. M. Poey, who was at first inclined to attack this theory, now warmly supports it, bringing forward numerous observations.

I have upon my table an amusing pamphlet by the Viscount du Moncel, entitled "*Notice historique et théorique sur le Tonnerre et les Eclairs,*" in which the subject of sheet lightning has been fully discussed.

It is with much regret I announce to you the death of a very celebrated zoologist, M. Dujardin, corresponding member of the Academy of Sciences. Felix Dujardin was born in 1801. He was the son of a clockmaker of Tours; but he cultivated natural history with so much success, that since the year 1839 he has occupied the chair of zoology at the Faculty of Sciences of Rennes, and has published many important works; among others, his "Natural History of Zoophytes," in which he combats Ehrenberg's views concerning the formation of vegetable earth; his "*Manuel de l'Observateur au Microscope;*" his "Natural History of Intestinal Worms," &c. &c. The death of M. Dujardin will be deeply felt by his pupils, and by all lovers of natural history.

An important election is about to take place at the French Academy of Sciences, namely, that of a foreign associate, to fill the vacancy left by the death of Alexander Von Humboldt. The name of Professor Ehrenberg stands first upon the list of candidates, and to this distinguished microscopist the honour will doubtless fall.

Proceedings of Societies.

North London Photographic Society.

The usual meeting of this Society was held on Wednesday evening, the 25th inst., G. Shadbolt, Esq., Vice-President, in the chair.

The minutes of the last meeting having been read and confirmed,

Mr. Dawson proceeded to read a paper, detailing a number of experiments he had made, on fixing positive prints, and which, he said, disproved the assertions of Messrs. Davanne and Girard.

Mr. Dawson commenced by apologising for the very hasty report of his experiments which he had submitted to the last meeting; but he had not then been able to obtain a full report of the *modus operandi* by which Messrs. Davanne and Girard had arrived at their conclusions. Nevertheless, he thought it dealt directly with the question, and he now knew that his opinion was strikingly corroborated by the researches of an eminent chemist, Mr. Hardwich. Messrs. Davanne and Girard asserted that, when a solution of hyposulphite of soda (and to facilitate the argument we will fix a determined strength for this—10 per cent., for example) has served to fix a proof, and has carried off the salts of silver not attacked by the light, it constitutes a solution, not of chloride or nitrate of silver in hyposulphite of soda, but double hyposulphite of soda and of silver in this same vehicle. Now direct experiment demonstrates that the real saturation of the hyposulphite of soda, by means of this double salt, is very rapidly attained; thus—by placing in contact a solution of hyposulphite of soda, at 10 per cent., and a great excess of recently-precipitated chloride of silver, filtering, and then leaving the liquid to settle—it will be perceived that, at the end of no very long time, a large portion of the double salt is deposited in a very pure and white crystalline state. If we then seek to determine the strength of this liquor—which does not alter in the air, and which must be considered as corresponding to the saturation of the hyposulphite by the double salt—we recognise, with astonishment, that this solution, at a temperature of 60°, does not contain more than 32 grains of silver to the quart, which corresponds to a little more than 2 parts of chloride of silver to 100 of new hyposulphite. Now, we know that a large sheet of paper contains, after sensitising, 1·82 grammes (15¼ grains) of chloride of silver alone; therefore, when about a sheet and a half have been passed (the paper being freed from its nitrate by washing in water) in a bath containing a quart of hyposulphite solution at 10 per cent., the bath will be saturated with double salt." This was the whole foundation for their argument, which he would now proceed to show was erroneous. Messrs. Davanne and Girard had selected rather a weak solution of hypo., namely, 10 per cent.; but this was not of much importance, inasmuch as hypo. of that strength would dissolve relatively as much chloride of silver as a solution of 60 per cent. He had made several solutions of 10 per cent. hypo. To one he added one-third of its weight of chloride of silver. This was solution No. 1. In another, he put rather more than one-third of its weight of chloride of silver. This was solution No. 2. To the third he added chloride of silver, till a white precipitate began to fall. This was solution No. 3. To these he applied the following tests:—

No. 1. (*a*) by evaporation produced brilliant crystals, very soluble in water, and also in a portion of its own solution.

(A) In a temperature varying from 40° to 65° no precipitate of any kind appeared at the end of three weeks. He afterwards fixed a picture with this part of the solution, which was apparently perfect.

No. 2 yielded similar crystals to No. 1, and in other respects behaved in a similar manner.

No. 3. (*a*.) The white crystalline salt was insoluble in water, but soluble in fresh hypo.

(B) The crystals showed their instability by rapidly changing, in rather a high temperature, into sulphide of silver. On the other hand, another solution, in rather an even temperature, showed no symptoms of decomposition at the end of a fortnight.

Some other experiments were also gone into for the purpose of showing the solvent power of hypo., without any tendency to decomposition. He had carefully kept out of view the probable effects of the organic and argento-organic compounds, &c., which in practice modified the results, for these had nothing to do with the present question. Messrs. Davanne and Girard made a precise statement, and founded it on what he considered a fallacious experiment. He ventured to think that had they thrown in a little more chloride of silver, nothing would have remained in their 10 per cent. solution of hypo., except chloride of sodium. In repeating the experiment (not yet finished), he had gone far enough to believe that he had found out the source of Messrs. Davanne and Girard's error. He added chloride of silver to hypo. until the precipitate ceased to fall. The supernatent liquor, by boiling, showed no symptoms of hyposulphite of silver, neither by the addition of nitric, hydrochloric, or sulphuric acid; but, on the addition of nitrate of silver, it threw down a large quantity of chloride of silver, showing all its characteristic properties. Paper floated on the liquor, and afterwards on nitrate of silver produced pictures, which he handed round. He concluded by doubting the existence of Herschel's second salt; for, if the indications shown above proved correct, that formula should not be $AgCl+NaO,S_2O_2=AgO,S_2O_2+NaO,S_2O_2$, but $AgCl+NaO,S_2O_2=AgO,S_2O_2+Na$ Cl left in solution. And, for the same reason, he doubted the existence of Herschel's first salt as a distinct body. But he hoped that some able chemist would investigate and settle this important question.

A discussion upon Mr. Dawson's paper ensued, in which Mr. Barber, Mr. Simpson, Mr. Hill, Mr. Hannaford, and the Chairman took part, which our limited space this week precludes the possibility of reporting. This we regret the less, inasmuch as we understand the discussion will be resumed at the next meeting.

Photographic Notes and Queries.

PYROGALLIC ACID DEVELOPING SOLUTION. STEREOSCOPIC POSITIVES ON GLASS.

Sir,—It may be useful to your readers, and to the photographic world in general—of whom your valuable journal is the powerful representative—to know that pyrogallic acid developing solution may be kept an almost indefinite time, by means of a small quantity of ether.

I have some which I made on September 11 last, adding sufficient ether to form a slight film on the surface. It is as colourless now, and develops equally well, as when first made—more than seven months ago; the only precaution necessary being to remove the developing solution when required for use, by means of a pipette or siphon, from any ether that may be floating on the surface; in fact, ether has the property of decolourising slightly-coloured solutions of pyrogallic acid when agitated with them. I am about to investigate the chemical or mechanical action which ensues, but I cannot state anything with certainty about it at present.

I should recommend methylated ether for economy, one ounce of which, at 2d., would preserve a quart or more of developing solution, saving the trouble of constant weighing, and the waste of decomposed solutions—not to mention the convenience of always having developing solution ready at any moment.

There is sufficient ether dissolved to cause it to run over the plate evenly; therefore, no alcohol need be added. Also, the evaporation of the ether keeps the solution, whilst in use, in constant motion, rendering unnecessary continual blowing.

I do not think it is generally known that stereoscopic positives on glass may be printed with much greater ease and facility with wet collodion than with dry plates, especially if the precaution be taken to wash off the nitrate of silver from the surface, saving the trouble of albumenising, washing, drying, &c., as in the Fothergill or collodio-albumen process.

I have lately been printing some beautiful little positives on glass with some old Fothergill collodion that has been iodised more than a year, and (singular though it may seem) sensitising in an old bath, intensely acid, that has lately been used for sensitising large quantities of salted and albumenised paper; washing off free nitrate of silver by a stream of water from a jug; placing the negative varnish side next to the sensitive film, and with a piece of black cloth behind. I exposed to the light of an ordinary gas-burner for *ten or fifteen seconds*. I then developed it with the above-mentioned developer—which had been kept seven months—without the slightest sign of fog or stain; nor have I ever found the collodion film to be injured by the negative. The whole process—from collodionising the glass to washing from the fixer—can be completed in from five to ten minutes. A. W. G.

DIPPERS.

Sir,—A slight improvement in the dipper which I described in No. 83, p. 378, of your journal, has occurred to me, which, perhaps, you will kindly insert.

Near each of the lower corners of the piece of glass which is to form the dipper, drill a good-sized hole, which may be done quickly and easily with a hardened bradawl, or the end of a three-cornered file, kept wet with turpentine, and worked carefully round. Then take a plug of thoroughly-softened gutta-percha; push one half of it through the hole, and press down the ends, so as to rivet it, as it were, to the glass.

It then only remains to work the gutta-percha round the corner of the glass until it forms a cap similar in shape to that figured in my former letter. Do the same at the other corner, and the dipper is complete, and perfectly safe; for it is impossible for the caps to give way, riveted, as they are, to the glass.

Gwenllian.

THE SOLAR CAMERA.

Sir,—In reply to your correspondent, "E. S. C.," I beg to refer him to my advertisement respecting the enlargement of small negatives by the solar camera. The objections to all solar camera pictures have been the want of sharpness—disagreeable tone—and the requirement of sunshine. Now, all these difficulties I can meet, and am prepared to produce pictures to any size—as sharp as the best camera pictures—permanently toned to any tint, and quite independent of the state of the weather. J. Webber.

Taunton, April 23, 1860.

BIRMINGHAM PHOTOGRAPHIC SOCIETY.

Sir,—In your last report of the Birmingham Photographic Society there is reference made to a Mr. Breese, and his successful manipulation. Could you prevail upon that gentleman to furnish your subscribers with his *modus operandi?* I apprehend it would be thankfully received by many amateurs, and, I am sure, by none more so than your subscriber, T. P. Bath.

*** Other correspondents have expressed a wish similar to the above.

MEETINGS OF PHOTOGRAPHIC SOCIETIES.

Tuesday,	May	1—London Photographic Society at King's College.
Wednesday,	,,	2—Manchester Photographic Society.
Thursday,	,,	3—City of Glasgow Photographic Society.
		3—Belfast Photographic Society.
Friday,	,,	5—Norwich Photographic Society.
Tuesday,	,,	8—Photographic Society of Scotland.
Wednesday,	,,	9—Chorlton Photographic Society.

TO CORRESPONDENTS.

City of Glasgow and West of Scotland Photographic Society.—The Report of the Meeting of this Society in our last impression was headed "Glasgow Photographic Society," and the full title of the Society was given in the first paragraph of the report. As, however, some members of the old Society, known as the "Glasgow Society," are still in existence, it will be desirable, in order to avoid the possibility of mistake, to print the full title of the new Society in all cases.

G. C. (Eton).—1. Moisten the film by immersion in a dish of distilled water, then place it in a solution of iodine in water (saturated), and let it remain a few minutes, then expose the plate to daylight for half a minute or so, to render the iodide reducible. Wash the plate freely with water, to remove the excess of iodine, then pour over it a developing solution of gallic acid, containing a few drops of nitrate of silver. When the image is sufficiently vigorous, wash it with a weak solution of cyanide of potassium ½ per cent. The application of the gallic acid must be performed in a dark room. 2. The subscription is one guinea per annum. Write to Dr. Diamond, the secretary. 3. Mr. Keene's modifications.

Ventosus.—If there is a chimney in the room, make a hole into it near the ceiling: while there is a fire, there will be a good upward current, but in summer time there may not be, unless you burn some paper, or shavings, to warm the flue. If there is no chimney, carry a piece of zinc piping out into the air, turning the end with an angle, to prevent admission of the light.

G. H. E. V.—It depends entirely on the focus of your lens. You can easily ascertain for yourself, treating the negative as a model. The nearer your lens is to it, the larger the picture on the focussing-screen. Place the negative opposite an open window. Any of the dealers in photographic apparatus will supply you with mounts, &c.

Seba T.—You cannot succeed in what you propose to undertake without much familiarity with chemical manipulation; much more, indeed, than a lady would like to acquire. A photographer need not be a "Jack of all trades," although almost every kind of knowledge will prove useful to him in one way or another.

Oxygen.—There are other things to be taken into consideration, besides those you have stated. State to an optician what you require, and he will provide you with the requisites. Cut out, or turn in lathe, cylinders of chalk, put them in a crucible and cover them with sand, and place the whole in a strong fire for three hours.

W. G. (Torquay).—Expose it to the sun's rays for a day or two, in a white glass bottle. This may possibly remedy the defect you complain of. We always use citric acid in the developer, and our preference for it is based upon two years' experience.

F. M. L.—We are gratified to learn that our efforts to improve the "Photographic News" are appreciated by those who are well qualified to judge. The subscription to the "News" for one year, including postage to France, is 17s. 4d.

W. Smith.—Yellow serge is the best thing for the purpose; if too dear, use yellow calico, double thickness. The spots *appear* to be due to bubbles in albumenising the paper; they may be due to splashes of cyanide.

F. Palmer.—The front lens answers very well in many combinations: it depends, however, upon the method of construction adopted by the maker.

Dead Black.—The velvet is preferable, and not expensive. You can get an accurate focus with the sliding body, without using the rack and pinion.

W. H. H.—Your bath was alkaline: the addition of acetic acid put it into working order. Kaolin has only a mechanical effect—not a chemical.

J. P. (Bath.)—The developing solution will "keep." We have had so many inquiries respecting it, that we have given the whole process in detail.

Zeno.—You had better write to the maker of the aplanatic lenses, stating what you desire to accomplish, and he will furnish you accordingly.

L. S. D.—The trouble is, probably, in your collodion; you have allowed the sediment to flow on the plate. Filter your nitrate bath every night.

L.—The turpentine waxed paper process is the best. The Rev. Lawson Sisson has published a book with details and specimens.

R. W.—The objections you make to the waxed-paper process do not really exist: you have not given sufficient attention to it.

P. P.—By washing your positives before putting them in hypo. you economise that salt, and render the print less liable to fade.

Randle.—You want an impossibility. If you cannot make it suit your purpose, you must obtain a fresh supply.

V. V.—Marine salt is culinary salt, the chemical name of which is chloride of sodium, formerly called muriate of soda.

L. B.—We cannot give you any authentic information as to the future prospects of carbon printing.

Obtuse.—All negative purposes only. You will require a different formula for positive collodion.

A. W.—The stereograms you have sent are wrongly mounted. You should have reversed them.

Ralph.—Immerse the plate for five or ten minutes in a weak silver bath before developing.

M. O. M.—You obtain the greatest portability in a metal camera as made by Mr. Melhuish.

Objective.—The stop should be placed between the lenses in the portrait combination.

Veto.—Coat the picture first with a colourless varnish, then apply the black varnish.

*** All editorial communications should be addressed to Messrs. Cassell, Petter, and Galpin, La Belle Sauvage Yard, London, E.C.

INDEX

N.B.—A dash rule represents the *italics* immediately preceding it.

A

B

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D

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F

END OF VOLUME III.

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